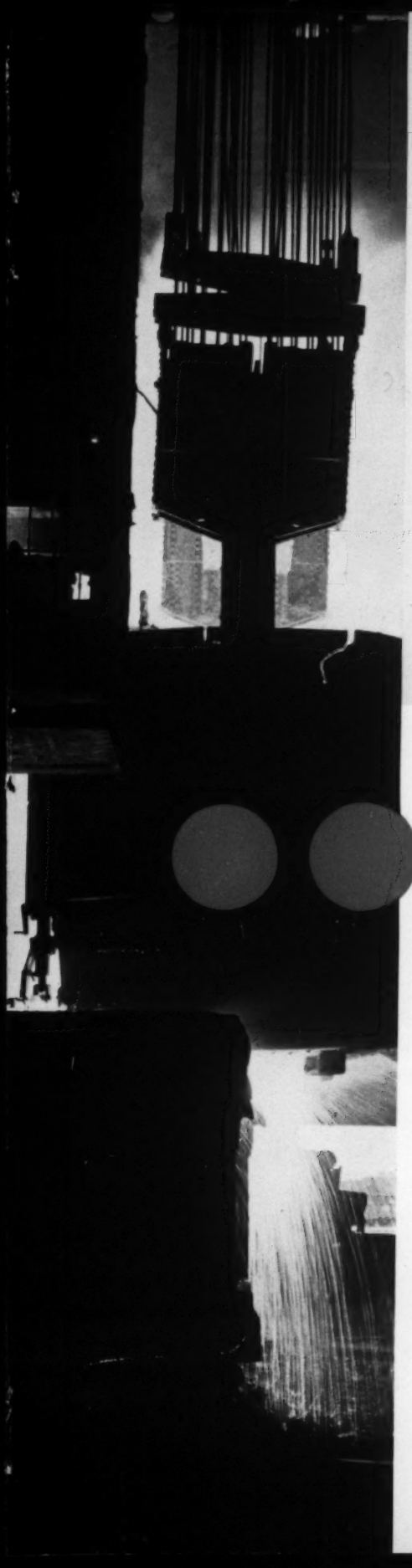

STEEL

The

Metalworking Weekly

NOVEMBER 28, 1960

A PENTON PUBLICATION

What Metalworking Expects in 1961

Page 67

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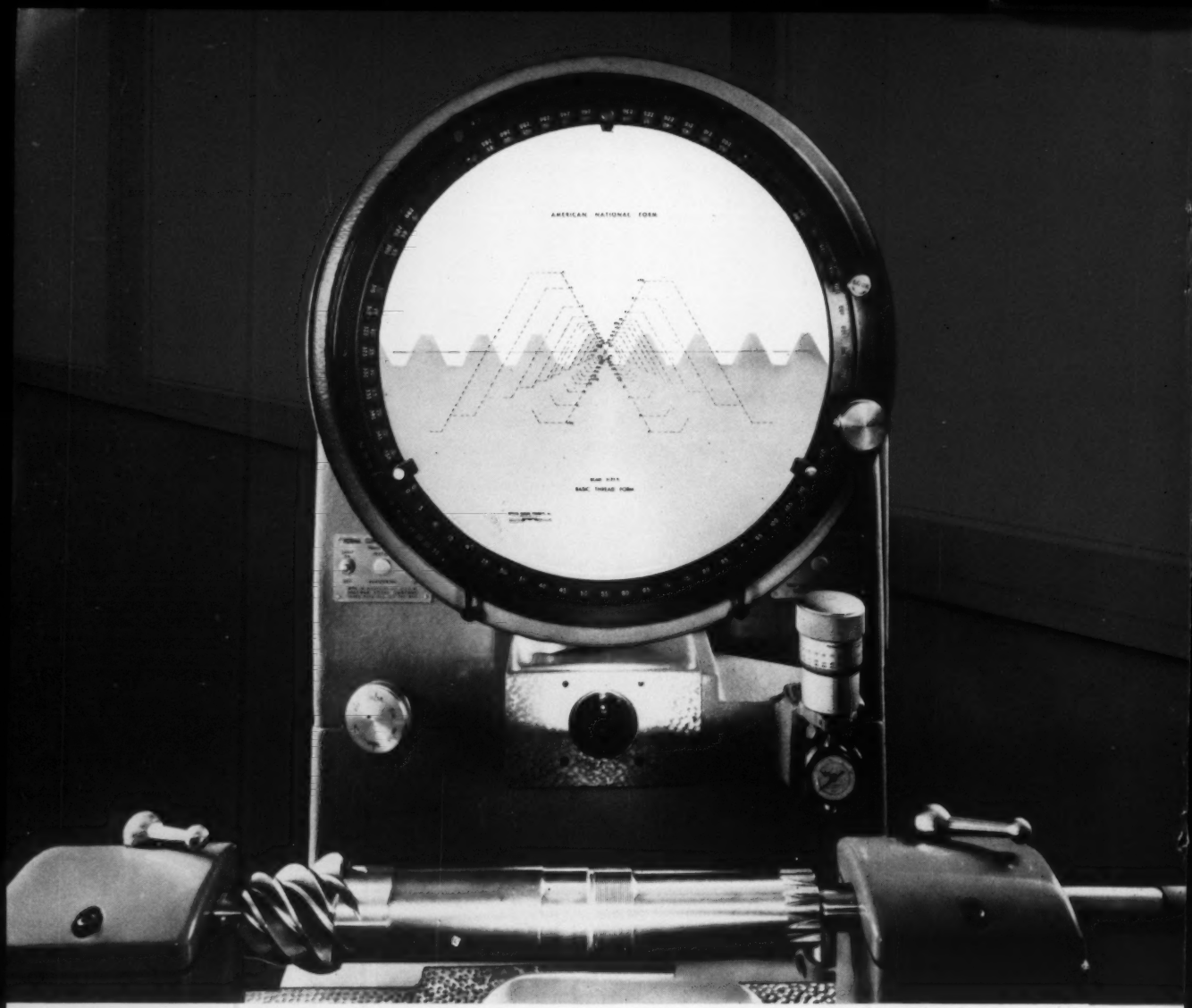

BETTER GEARS by making mountains out of molehills

This optical comparator is doing just that. The threads on the pinion in the foreground are magnified 31.25 times on the calibrated screen for intensely accurate inspection.

This is one of many details of gear manufacture and inspection that have won Double Diamond gears their reputation as gears thoroughly qualified for high level performance in any application for which you buy them.

Our sales representatives are engineers and gear designers—ready to tackle a gear assignment at any stage of its development. When may one call on you? Just write or phone.

EATON

AUTOMOTIVE GEAR DIVISION
MANUFACTURING COMPANY
RICHMOND, INDIANA

GEARS FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS
GEAR-MAKERS TO LEADING MANUFACTURERS

This Week in STEEL

The Metalworking Weekly

November 28, 1960 Vol. 147 No. 22

What Metalworking Expects in 1961

The outlook for metalworking in '61 is described as plodding prosperity. The consensus of 7450 general managers of metalworking plants surveyed by STEEL indicates it'll be a good year: Sales up about 5 per cent from 1960's, profits up less than 2 per cent. It'll be a fiercely competitive year too. Price hikes will be hard to push through and foreign goods will pour into the U. S. in greater volume. PAGE 67

Ways to Boost Marketing Efficiency; Auto Forecast

Robert J. Eggert, marketing research manager, Ford Motor Co., suggests eight ways to make your distribution function more efficient. Among his points: Shift part of the marketing cost to the consumer. Improve serviceability of consumer durable goods. Adopt mechanical aids. Establish a common world language. Expand the use of marketing research as a tool in anticipating customer satisfaction. Mr. Eggert also makes a forecast in the Mirrors of Motordom column this week, including a sales projection of 6.3 million domestic cars in 1961. PAGES 75, 87

Auto Expert Stresses Color on Steel Buildings

Experience in auto production convinced Hillery Knecht, now vice-president, manufacturing, Stran-Steel Div., National Steel Corp., that mass production methods could be applied successfully to the manufacture of steel buildings, adding eye appeal and reducing production costs. To fabricate roof and wall panels, galvanized steel strip is paid off an uncoiler through a roll forming mill (photo). Formed strip is cut to panel lengths, bond coated, then sprayed with one of nine standard colors at the Stran-Steel plant, Terre Haute, Ind. PAGE 114

Electric Melting Boosts Foundry Flexibility

Electric arc furnaces in three sizes provide more flexibility in heat sizes and steel analysis at Birdsboro Corp., Birdsboro, Pa. The foundry can now turn out high quality, stainless steels—and other high alloy steels—for castings. It was limited to carbon and low alloy steels. PAGE 122

Long Term Uptrend Seen by Welding Electrode Makers

Makers of welding electrodes see some improvement early next year from currently depressed sales levels, but 1961's output will still fall short of the 1960 totals. However, new applications, especially in continuous processes, promise a long term growth pattern for the industry. PAGE 143

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Now Bethlehem forges every hardened steel roll from vacuum-degassed steel!

Bethlehem vacuum-degassed steel minimizes the hazard of roll breakage.

Pint size, king size, every in-between size. Now Bethlehem forges *every* hardened steel roll from vacuum-degassed steel.

PIONEER IN "VACUUM CASTING"

Bethlehem pioneered the development and use of vacuum-degassed ingots for highly stressed applications in the electric power, atomic energy, and other industries.

With our advanced steel-pouring techniques, we can pour molten steel from a furnace ladle to a secondary ladle within a vacuum chamber, and thereby remove harmful gases (we can also pour directly into a mold in the vacuum chamber). The secondary ladle is then taken out of the chamber and ingots of suitable size for hardened steel rolls can be cast under a blanket of inert gas.

LESS GAS MEANS SOUNDER STEEL

Because the vacuum-casting method reduces the volume of hydrogen and other gases, the steel is sounder, tougher, and cleaner than air-cast steel. It is this greater internal soundness which reduces the hazard of roll breakage.

OVER 350 ROLLS NOW IN SERVICE

In the past several years, we've produced and shipped more than 350 large, vacuum-degassed hardened steel rolls. The outstanding performance of these rolls confirms the superior soundness of vacuum-cast rolls as compared to air-cast rolls.

FAST DELIVERY . . . NO EXTRA COST

You have everything to gain (less roll breakage), nothing to lose (no price extra) by making your next purchase of hardened steel rolls Bethlehem vacuum-degassed rolls. Deliveries are excellent. Our sales offices are ready to give you the *whole* interesting story of this new Bethlehem development. Call or write the office nearest you today. Or write to us at Bethlehem, Pa.

Steel *for Strength . . . Economy . . . Versatility*

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

LOOK FOR THIS "V" STAMP on the ends of the rolls you buy . . . "V" is for vacuum. You'll find this permanent identification on every Bethlehem roll from now on . . . because from now on Bethlehem will forge *only* from vacuum-degassed steel.

LOOK FOR THIS LABEL on the packing of the hardened steel rolls you buy. It's your guarantee that your rolls are forged from Bethlehem vacuum-degassed steel . . . steel that minimizes the hazard of roll breakage in your plant.

BETHLEHEM STEEL
BETHLEHEM
VACUUM-DEGASSED
HARDENED STEEL
ROLL

Coro-Gard® 1706 withstands

BRAND PROTECTIVE COATING

METAL coated with Coro-Gard 1706, right side, shows no effect from salt spray attack. Corroded left side is untreated.

2000-hour corrosion attack

Real corrosion resistance!—That's what you get when you specify new CORO-GARD 1706 Brand Protective Coating.

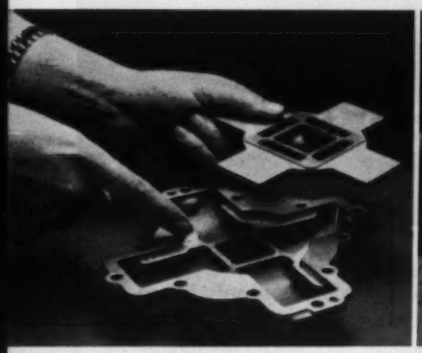
Specify CORO-GARD 1706 Coating for steel, aluminum, wood, concrete, cloth, even some plastics—wherever corrosion or abrasion must be fought. It provides maximum protection at low cost, brushes on as easily as paint. Self-priming, it goes on vertical surfaces with minimum sagging, provides unusually high coverage for economical use.

This neoprene rubber based coating air-cures to a tough, rubbery, protective film with exceptional resistance to corrosive fluids and fumes, water and abrasion. It successfully resisted a 2000-hour salt spray attack, a 20-week submersion in 20% solution of hydrochloric acid, and a six-month weather exposure in Miami, Florida. After all this, CORO-GARD 1706 Coating still maintained its exceptional adhesion and flexibility, its corrosion and abrasion resistance.

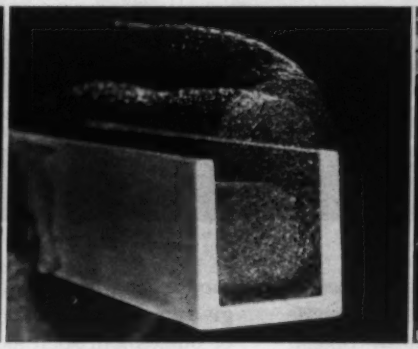
See how CORO-GARD 1706 Coating can help you. For complete information, write today on your company letterhead, specifying area of interest, to: AC&S Division, 3M, Dept. SBEE-110, St. Paul 6, Minn.

"CORO-GARD" is a Reg. T.M. of 3M Co.

News about other 3M products



SIMPLIFIED PRODUCTION. 3M Adhesive EC-1386 bonds sections of hollow castings. This simplified method of producing complex castings eliminates high rejection rate of sand molding, costly machining, equipment required for mechanical fastening. The adhesive bond fills voids, cures quickly, can be machined for final touch-up.



SURE WAY TO SEAL. 3M Heat Expandable Sealers expand up to 125% under the normal heat of a paint-baking cycle, cure to a tough, flexible mass that keeps out dirt, water and weather, completely seal even the most irregular gap or seam. The unexpanded solid is also efficient as a gasket replacement sealer, flange sealer, and for other sealing jobs.

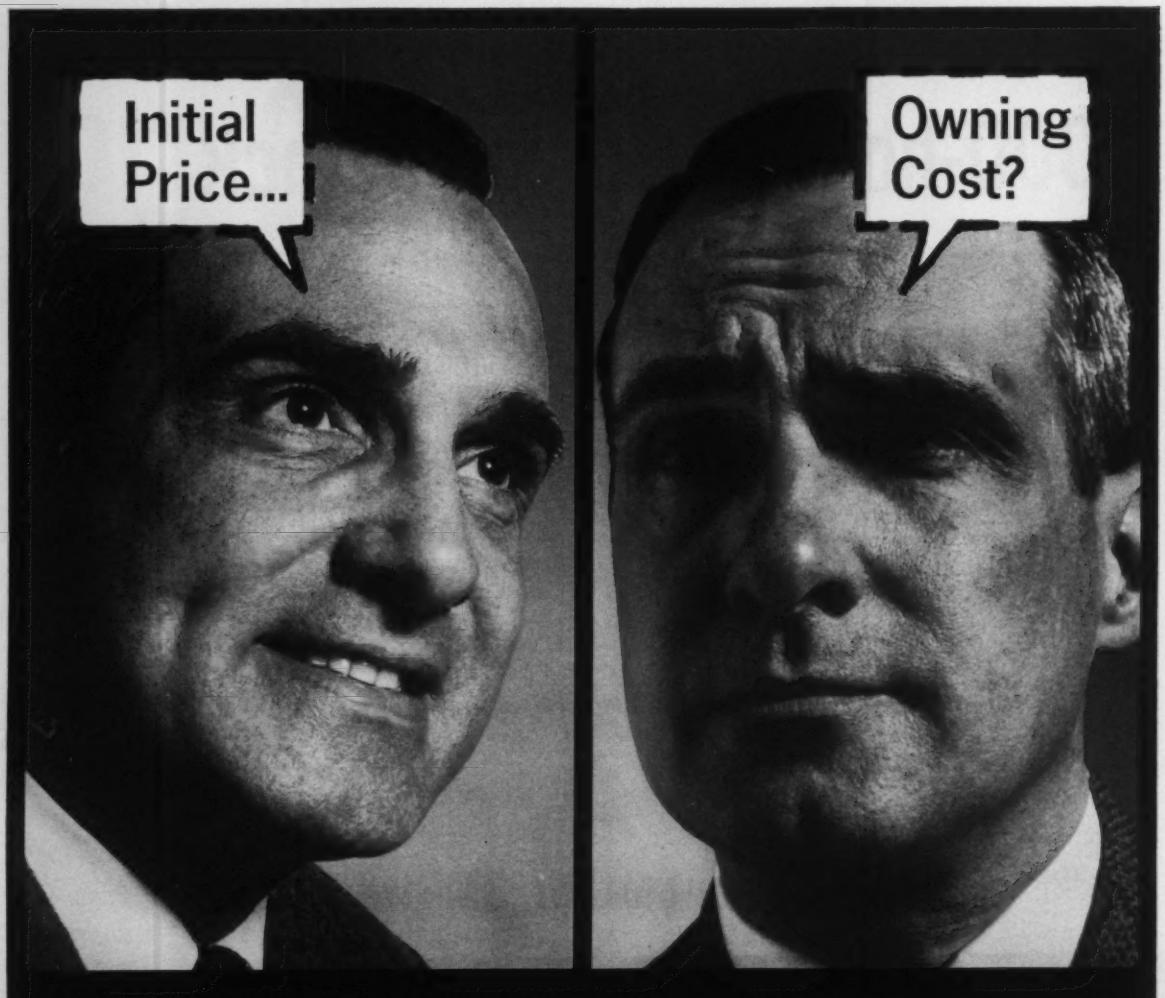
COLD SANDWICH BONDING. 3M Adhesive EC-1357 makes it possible to bond sandwich panels with a nip roller or cold press. You need no clamps or heated presses to complete tough core-to-skin bonds that resist moisture and high and low temperatures. This one adhesive bonds a variety of materials quickly, economically. Because of its dark color, it absorbs infrared heat quickly, dries fast.

ADHESIVES, COATINGS AND SEALERS DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY



Knowing both can keep your steel costs low

Steel is low in cost. If your *final* cost figure doesn't reflect that, then unnecessary, hidden expenses may be creeping into your operations. If you haven't done so, figure your costs of possession —like taxes and insurance, storing and handling. They may be adding to *your* steel costs. Often your steel service center can help you reduce them.

Each steel user's case is different. Ask your steel service center to help you determine the most economical way to buy steel. They will give you a helpful guide for figuring all your costs of possession, such as:

Cost of capital:	Cost of operation:	Other costs:
Inventory	Space	Obsolescence
Space	Material handling	Insurance
Equipment	Cutting & burning	Taxes
	Scrap & wastage	Accounting

Call your nearby steel service center, or write for free booklet, "What's Your Real Cost of Possession for Steel?"

STEEL SERVICE CENTER INSTITUTE

...YOUR STEEL SERVICE CENTER

Steel

STEEL SERVICE CENTER INSTITUTE
540-A Terminal Tower, Cleveland 13, Ohio

Usership Winner No. 8 Picks Up . . .

. . . $500 in STEEL's September Usership Idea of the Month Contest. The top man is Ralph H. Stearns, manager, Industrial Engineering (Southbridge, Mass.), American Optical Co. A commemorative plaque, a $500 check, and an Honorary Editor card (No. 11) were given to Mr. Stearns to mark his achievement.

"STEEL is currently my main tool to cope with the two other explosions—occurring along with the population explosion—namely, the information explosion and the competition explosion. Objective: Sharpen our competitive edge by continuously funneling STEEL-inspired thought starters to people in our organization who have not previously noted the article or its impact.

"I read STEEL no longer with an underlining pencil but with a pair of shears. I have a loose leaf notebook . . . for clippings in five categories:

- **"International Competition and World Trade**—I found it impossible to clip all the items from the Sept. 5 issue, 'Our Fight for Survival in New World Market,' so the issue was inserted intact in my notebook.
- **"New Uses for Old Materials**—the Sept. 12 Metalworking Week item on stretching lake boats.
- **"Replacing Ineffective Operations** — 'What Champion's Doing to Rebuild,' Sept. 19 issue.
- **"New Products and Ideas**—'Alcoa Bids to Obsolete the Can Opener,' also Sept. 19.
- **"Resistance to Change** — W. J. Campbell's classic editorial on the trouble with railroads. (They have insisted they are in the railroad business.) This has been passed across the desk to each of my visitors for the last few weeks.

"I use the clippings to sell cost improvement and receptivity to new ideas through supervisory training sessions, individual contacts, and self-produced, intracompany sound films.

"Improving the climate for trying out new ideas should certainly be reflected increasingly in our Cost Improvement Program . . ."

The competition for awards in the September contest was among the stiffest the judges had encountered in their eight month stint. Albert J. Kuhn, vice president-purchases, Huenefeld Co., Cincinnati, earned a second honorable mention (his first was in the July contest) and thereby garnered the title of Honorary Editor No. 12. L. C. Davis, manufacturing engineer, Medium Alternating Current Motor & Generator Dept. (San Jose, Calif.), General Electric Co., submitted two entries in the September contest, and lo, both earned honorable mentions. In recognition, the editors decided he also should become an Honorary Editor.

Other Honorable Mentions . . .

. . . went to Carl Baczenas, supervisor of information and promotion, Granite City Steel Co., Granite City, Ill.; John C. Bigham, salesman, Vulcan-Kidd Steel Div. (Detroit), H. K. Porter Company Inc.; Wade W. Cornwell, secretary, Yacht Constructors Inc., Portland, Oreg.; R. E. McCullough, director of advanced manufacturing research, AC Electronics Div. (Milwaukee) General Motors Corp.; Fred Mueller, president, Modern Equipment Co., Port Washington, Wis.; Richard T. Samuelson, mechanical engineer, Plumbing & Heating Div. (Louisville), American Radiator & Standard Sanitary Corp.

With the exception of Mr. Kuhn, who had received a lighter for his previous effort, each honorable mention winner was presented with a desk lighter.

You Can Win $1000 This Month . . .

. . . in STEEL's Usership Idea of the Month Contest. Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—November, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

There's more . . . you will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month award.

Please identify your letters as Usership entries. They will be judged by a committee of STEEL's

"the HITCHINER way..."

...and non-machinable super alloys in INVESTMENT CASTING

These spray nozzles for highway striping paint sprayers were formerly machined out of cold rolled bar stock. When ordinary paint was used, these nozzles functioned satisfactorily. However, when ground glass was added to the paint for reflecting purposes excessive wear caused frequent replacement.

By "the HITCHINER way . . .", we were able to engineer the manufacture of this part by investment casting in a non-machinable type alloy exhibiting a very high degree of resistance to both wear and corrosion.

This change of alloy, which eliminated the need for frequent nozzle replacement, was made possible through investment casting because the required close dimensional tolerances and detail could be cast to size.

Through the wide freedom of choice in alloy, as well as through flexibility in design and the elimination of expensive machining operations, investment casting may possibly solve your metal parts manufacturing problems. Send us your sample or blueprint and find out with a Hitchiner "engineered quotation" — no obligation.

NO LIMITATIONS. From miniature ball bearing races to 20" Steam Turbine Impellers, "the Hitchiner way . . ." with investment castings can help you. Send for our latest revised brochure and find out for yourself. It's free.

HITCHINER

MILFORD 29, NEW HAMPSHIRE

Coast to Coast Engineering Representatives

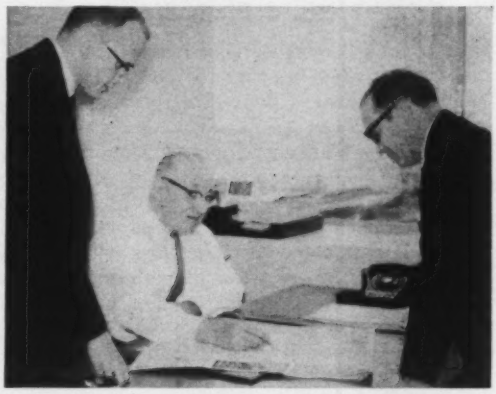
editors. All letters become STEEL's property.

You can enter as many times as you wish. Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. **Deadline for this month's contest is Jan. 1, 1961.**

Checking Foreign Markets

In the next three issues you'll be given a look at marketing opportunities in Australia and Japan (Dec. 5), Western Europe (Dec. 12), and South America (Dec. 19). Assistant Editor Derry Eynon, the editor who writes Foreign Communique, is at the helm for the series. He surveyed a host of foreign government officials and trade experts to plot his course.

When Derry said he was going to the Cleveland office of the British Consulate General to pick up some market data, we loped along, toting



our camera. The result: Derry (left) interviewing Commercial Officers Sidney Mittens (seated) and Joe O'Connor.

Our arrival in their offices coincided with tea time (3:30 p.m.). A pleasant lady soon materialized, carrying a tray with four cups of tea, and murmuring: "Would you care for milk?" We declined and entered upon 15 minutes of social chit chat by inquiring about the brand of tea used. It was luscious. No tea bags in sight. One of the gentlemen replied: "Lipton's . . . Sir John's, I think. No matter. It's good. What?"

Mr. O'Connor had, until his arrival in Cleveland two years ago, spent 12 years with the home service in London. At No. 9 Downing Street, to be exact, next door to what was once called the Garden of Eden.

Mr. Mittens has been in the U. S. for 40 years, 19 of them with Her Majesty's government. These gentlemen are part of the liaison staff between the United Kingdom and the U. S. in commercial affairs. "We always welcome inquiries at our consulate offices," said Mr. Mittens. "We will gladly develop information," they chimed. So they did. We recommend a visit. Morning tea time is 10:30.

...Fluid Power NEWS

REPORT NO. 11,802 AUTOMATIC METALS BRIQUETTING PRESSES

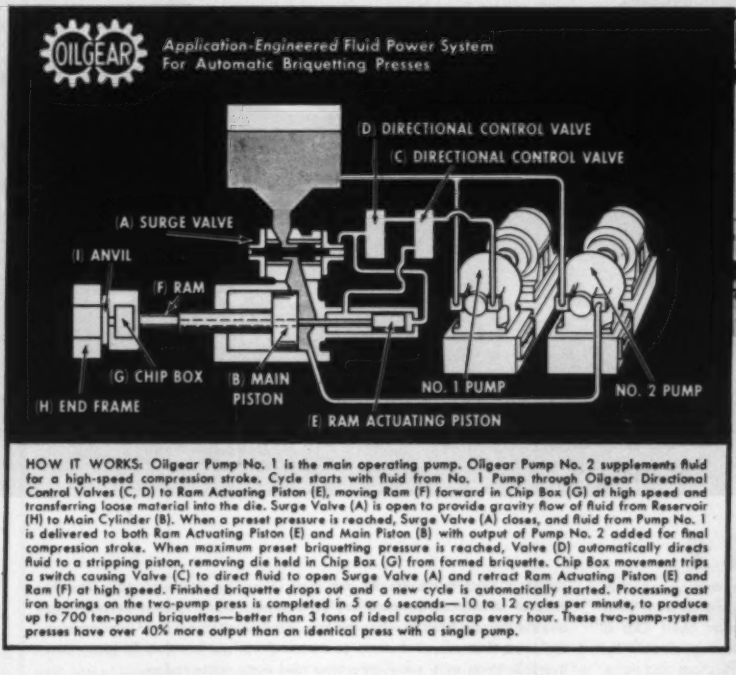
From Oilgear *Application-Engineering* Files

HOW OILGEAR-EQUIPPED BRIQUETTING PRESSES PRODUCE MORE—LONGER—AUTOMATICALLY

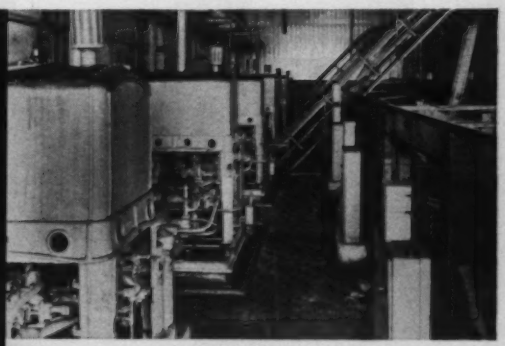
CUSTOMER: *Milwaukee Foundry Equipment Division of SPO Inc.*

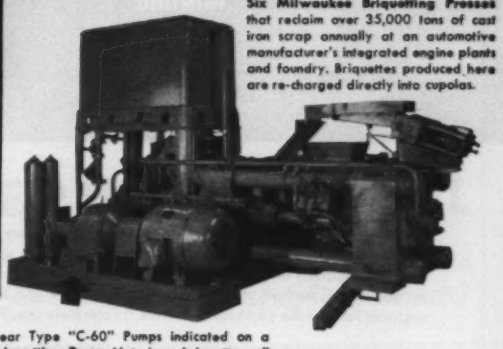
DATA: To power a line of presses specially designed for low cost, rapid conversion of bulky, low-grade metal turnings and borings into dense, uniform-sized briquettes to: conserve storage space; simplify handling; prevent storage oxidation—particularly with finely divided metals or sponge iron; provide sufficient density and size to melt rather than flash into oxide on entry into foundry cupola; control metal content; provide a simple means of accurate compounding for alloying or supplying a flux.

PRESS SYSTEM REQUIREMENTS: 1. Eliminate wear and maintenance costs resulting from use of gears and bearings. 2. To be controlled hydraulically, electrically, or electrohydraulically for automatic cycling at rates ranging from 9 to 17 strokes per minute. 3. Sufficient force to provide briquette densities of 70 to 80% with conservative pump loading. 4. Long life, rugged dependability . . . capable of years of continuous operation with an absolute minimum of maintenance.



HOW IT WORKS: Oilgear Pump No. 1 is the main operating pump. Oilgear Pump No. 2 supplements fluid for a high-speed compression stroke. Cycle starts with fluid from No. 1 Pump through Oilgear Directional Control Valves (C, D) to Ram Actuating Piston (E), moving Ram (F) forward in Chip Box (G) at high speed and transferring loose material into the die. Surge Valve (A) is open to provide gravity flow of fluid from Reservoir (H) to Main Cylinder (B). When a preset pressure is reached, Surge Valve (A) closes, and fluid from Pump No. 1 is delivered to both Ram Actuating Piston (E) and Main Piston (B) with output of Pump No. 2 added for final compression stroke. When maximum preset briquetting pressure is reached, Valve (D) automatically directs fluid to a stripping piston, removing die held in Chip Box (G) from formed briquette. Chip Box movement trips a switch causing Valve (C) to direct fluid to open Surge Valve (A) and retract Ram Actuating Piston (E) and Ram (F) at high speed. Finished briquette drops out and a new cycle is automatically started. Processing cast iron borings on the two-pump press is completed in 5 or 6 seconds—10 to 12 cycles per minute, to produce up to 700 ten-pound briquettes—better than 3 tons of ideal cupola scrap every hour. These two-pump-system presses have over 40% more output than an identical press with a single pump.





Six Milwaukee Briquetting Presses that reclaim over 35,000 tons of cast iron scrap annually at an automotive manufacturer's integrated engine plants and foundry. Briquettes produced here are re-charged directly into cupolas.

One of the two Oilgear Type "C-60" Pumps indicated on a 350-ton **Milwaukee Briquetting Press.** Note how briquettes roll out of the press to be picked up by magnets.

SOLUTION: Oilgear *Application-Engineered* systems consisting of Oilgear Type "C" Heavy-Duty Constant Displacement Radial Rolling Piston Pumps and Directional Control Valves. Pump requirements range from 23 gpm on the 75-ton Presses to 325 gpm on new 1000-ton presses. *Milwaukee Foundry Equipment*—builder of over 80% of all briquetting presses, and an exclusive user of Oilgear Fluid Power Systems since 1927—recently reported: "*We just modernized a press that had been in continuous cast iron briquetting operation for over 18 years . . . there had been no reported major maintenance . . . the Oilgear components still operated fine—with no appreciable signs of wear or loss in efficiency.*"

This is just one evidence—out of hundreds—of the long service life of Oilgear Systems. Ten or more years of continuous service is common with Oilgear equipment, rather than the exception . . . with many of these systems operating under adverse conditions—rapid cycling, grit-laden air, heat, and extreme humidity. Where the going is toughest—Oilgear Pumps just keep rolling along . . . quietly, efficiently.

With Oilgear Heavy-Duty System Components designed for thousands of hours of continuous service at full rated load, savings are compounded with every hour of uninterrupted performance. That's why machinery and equipment manufacturers and *their* customers say . . .

"for the lowest cost per year . . . it's Oilgear!"

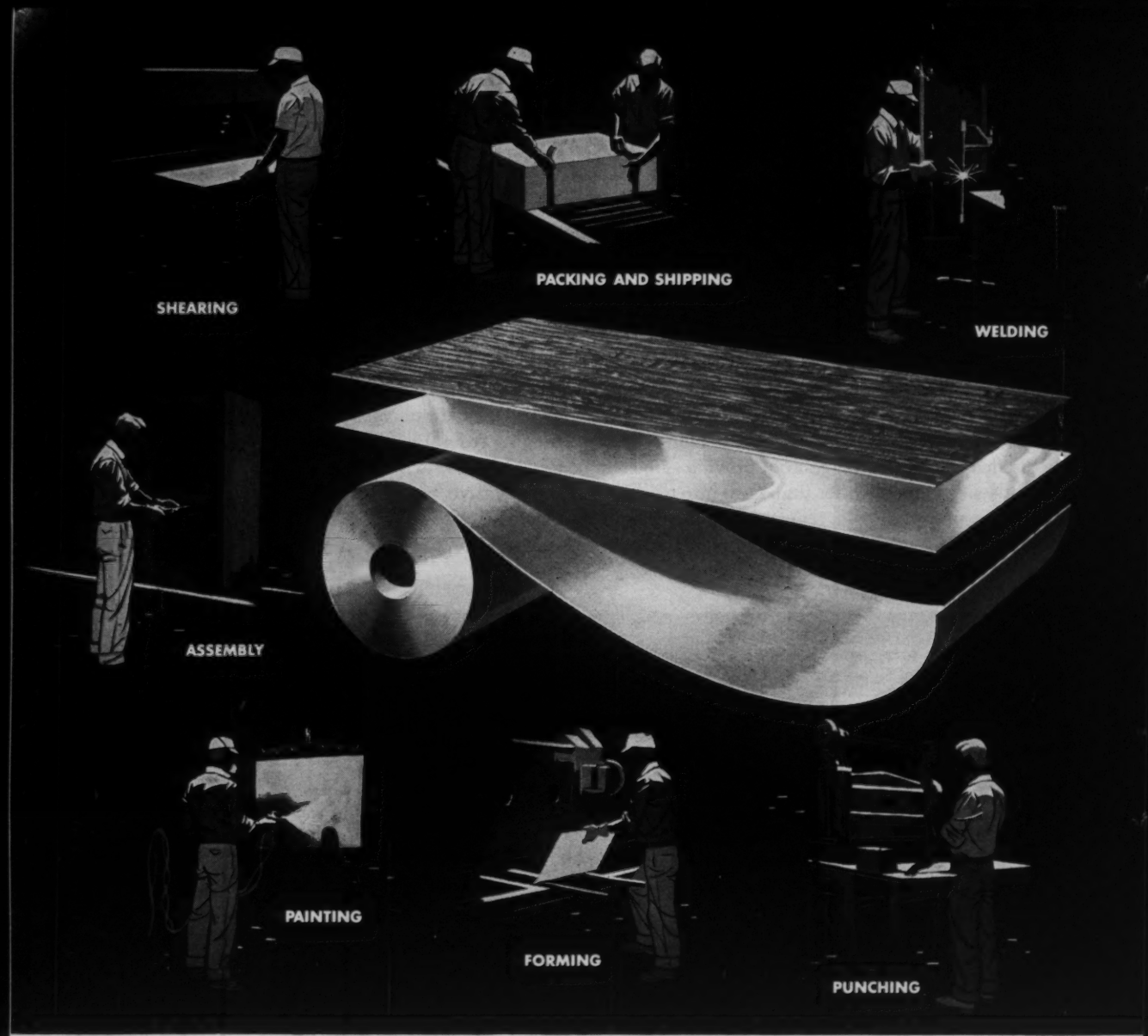
For solutions to YOUR linear or rotary Controlled Motion problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements, directly to . . .

THE OILGEAR COMPANY

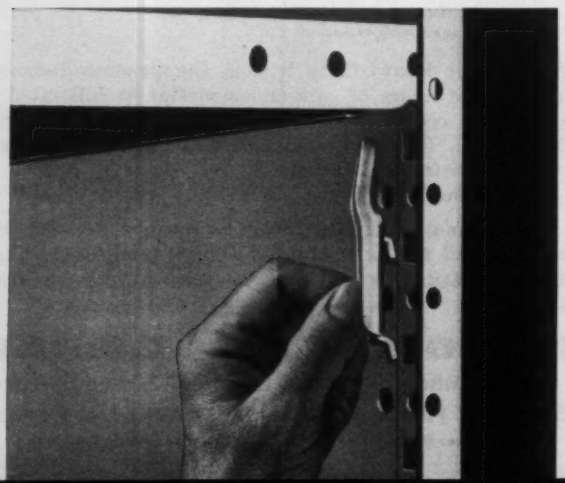
Application-Engineered Controlled Motion Systems

1572 WEST PIERCE STREET • MILWAUKEE 4, WISCONSIN

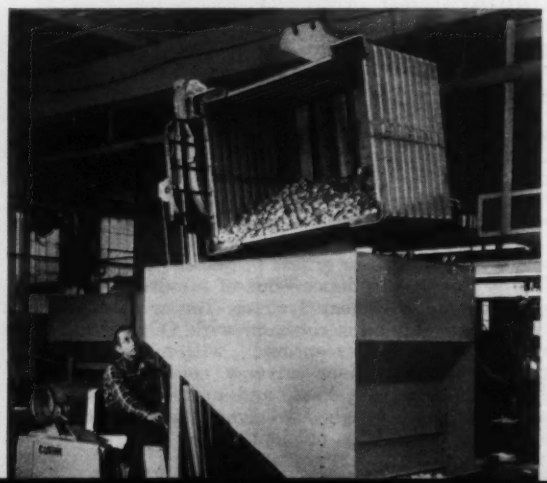
Phone: Mitchell 5-6715 . . . Direct Distance Dialing Code 414



REPUBLIC COMPRESSION SHELF CLIP is designed to ease and speed steel shelving erection. No tools needed. Simply slip clips into uprights, snap shelf in place. Supports heavy loads safely. Republic Compression Shelf Clip is an economical method of solving shelving problems and is a profitable investment for over the years service. Write for complete specifications and data.



REPUBLIC ROLL-OVER BOXES are used in moving materials to assembly lines at Whirlpool Corporation, St. Joseph, Mich. Channel shaped legs enable narrow forks to enter the legs, lift the unit, roll it over to hopperize the load, then return the unit to a normal upright position. To learn how Republic Units save production time and costs, write today.



REPUBLIC SHEET STEEL FABRICATION "KNOW-HOW"

Solves Manufacturing, Assembly, Delivery problems

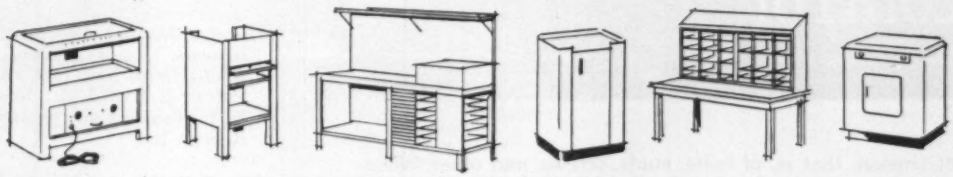
Republic's Berger Division complete sheet steel fabrication "know-how" may be the answer in giving your products a new look, new market acceptance, new sales potential.

Berger has experienced engineers and craftsmen, and the facilities and abilities to manufacture sheet steel products from galvanized steels, stainless steels, and the new vinyl coated sheet steels.

Berger offers a well rounded stock of tools and dies, modern assembly lines for shearing, punching, forming, finishing, and painting. Standard and special arc, spot, and gas welders designed for production line assembly. Tumbling barrels and plating equipment. Grinders and sanders.

Finest finishing facilities, including Bonderizing and electrostatic paint spray equipment. Finishing conveyors through spray booths, dip tanks, and baking ovens. Automatic material handling equipment. Completely mechanized crating department with conveyor line carton-packaging facilities.

Let Berger Division engineers work with you in designing and developing your product. Use Berger facilities to solve manufacturing and delivery problems. For complete details, contact Berger's Contract Manufacturing Department, today!



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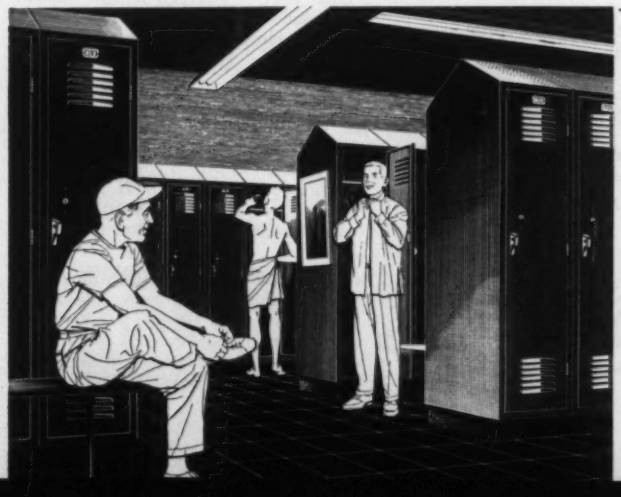
World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL LOCKERS give change, wash, and dress centers a new look, protect employee valuables and tools. Available with popular locking devices. Handles attached with tamper-free Gulmite screws and lockwashers. Bonderizing protects against rust and corrosion, reduces maintenance costs. Republic will help you with your locker planning and assume full responsibility for installation. Send coupon.



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Please send more information on the following products:

☐ Republic Contract Facilities ☐ Have representative call
☐ Republic Compression Shelf Clip
☐ Republic Material Handling Service ☐ Republic Steel Lockers

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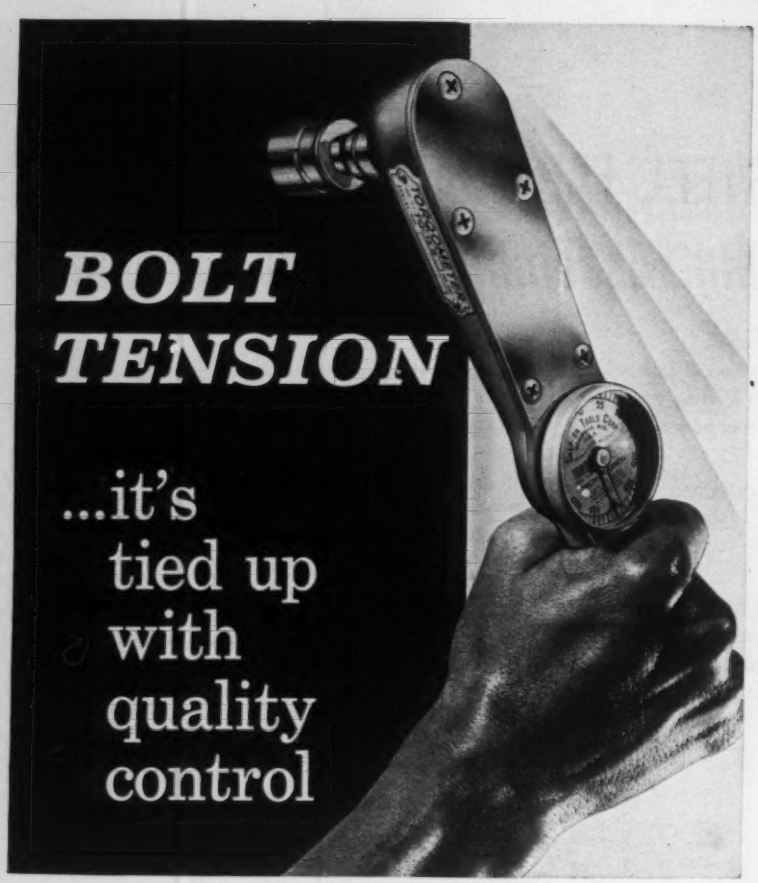

Correct tension, that is, of bolts, studs, screws, and other fasteners used in product assembly. Without tension control there is no quality control.

For example, uneven tightening of head bolts causes warping and engine trouble. Improper tension of fasteners in aircraft components sets up dangerous stresses and strains. Measuring devices, electronic components, frames, fittings, high-pressure containers — these and many other products require uniform tension on screws and bolts for proper operation.

That is why SNAP-ON® Torqometers® are being used more and more on assembly and maintenance work. These precision wrenches tighten bolts and studs to exact predetermined tensions. Or they may be used to spot check the tension on bolts tightened with power impact tools. Easy-to-read dials show torque measurement in either inch-pounds or foot-pounds.

SNAP-ON offers Torqometers in a wide range of sizes, plus torque drivers for proper tensioning of screws. These are widely used in electronic and electrical assembly.

If exact tension on fasteners is part of your quality control, or if you suspect that lack of such control may be a source of trouble, call in a SNAP-ON Sales Engineer. He can offer qualified advice on torque-measuring problems, and provide a complete range of hand tools and wrenches for assembly or maintenance. Write us or call your nearest SNAP-ON Branch.

FOR ALL INDUSTRY

SNAP-ON TOOLS

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CALENDAR
OF MEETINGS

Nov. 28-Dec. 2, Exposition of Power & Mechanical Engineering: Coliseum, New York. Information: International Exposition Co., 480 Lexington Ave., New York 17, N. Y.

Nov. 29-Dec. 1, Electronic Industries Association: Winter meeting, Fairmont Hotel, San Francisco. Association's address: 1721 DeSales St. N.W., Washington 6, D. C. Secretary: James D. Secrest.

Nov. 30-Dec. 2, Metallurgical Society of AIME: Electric furnace conference, Morrison Hotel, Chicago. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Dec. 3-6, American Institute of Chemical Engineers: Annual meeting, New Yorker Hotel, New York. Institute's address: 25 W. 45th St., New York 36, New York. Secretary: F. J. Van Antwerpen.

Dec. 6, Electric Overhead Crane Institute: Annual meeting, Carlton House, Pittsburgh. Institute's address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: J. H. Peritz.

Dec. 7-9, National Association of Manufacturers: Annual meeting, Waldorf-Astoria Hotel, New York. Association's address: 2 E. 48th St., New York 17, N. Y. Executive vice president: Charles R. Sligh Jr.

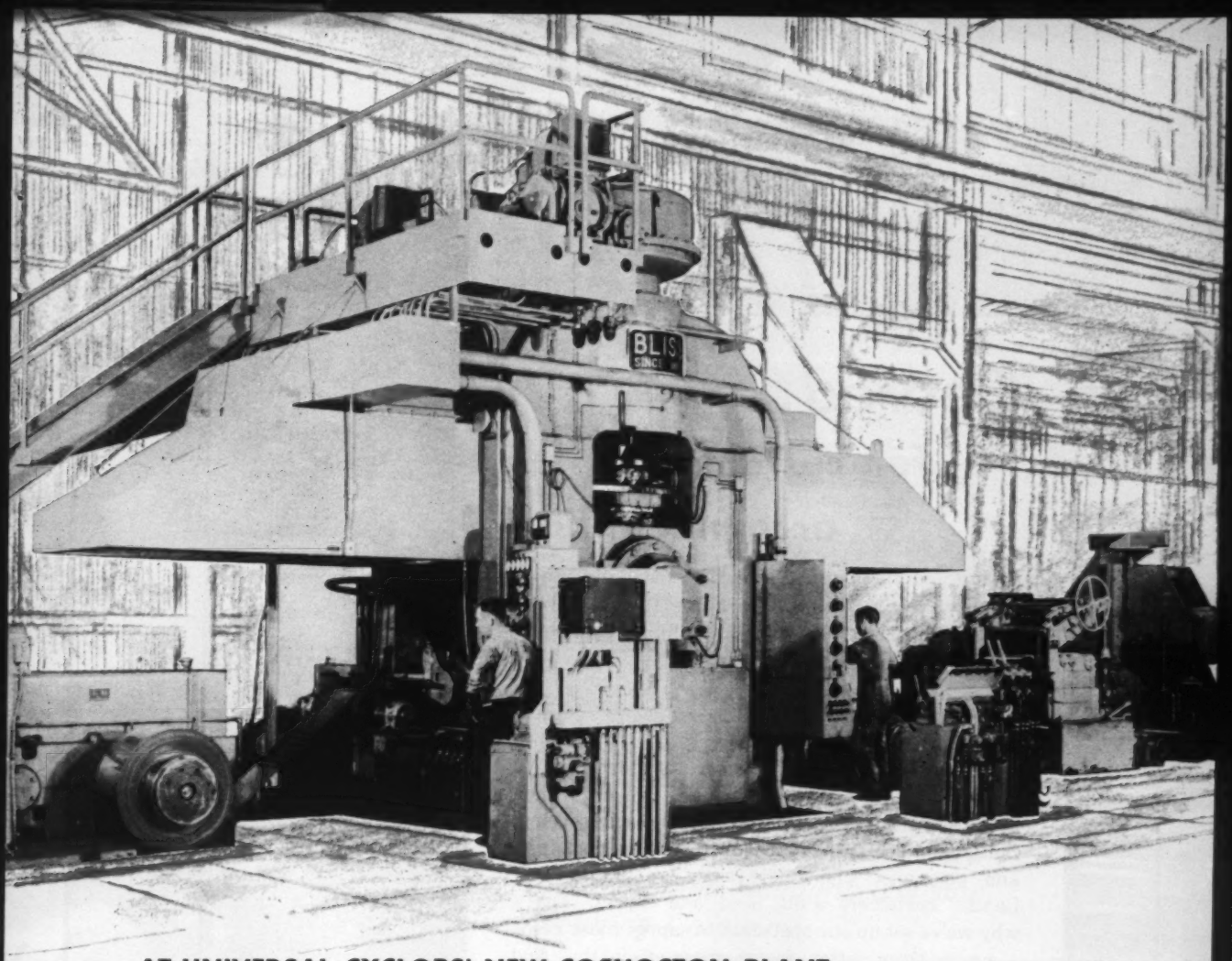
Dec. 12-15, Atomic Industrial Forum and American Nuclear Society: Atomic industry exhibitions and conferences, California Masonic Memorial Temple, Fairmont and Mark Hopkins Hotels, San Francisco. Information: AIF, 3 E. 54th St., New York 22, N. Y. Executive manager: Charles Robbins.

Dec. 12-15, Industrial Building Exposition & Congress: Coliseum, New York. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Dec. 28-30, American Marketing Association: Annual convention and exhibit, Coronado Hotel, St. Louis. Association's address: 27 E. Monroe St., Chicago 3, Ill. Executive director: Vance E. Lockhart.

Jan. 8-11, Institute of Scrap Iron & Steel Inc.: Annual meeting, Fontainebleau and Eden Roc Hotels, Miami Beach, Fla. Institute's address: 1729 H St., N.W., Washington 6, D. C. Assistant executive vice president: William S. Story.

Jan. 9-13, Society of Automotive Engineers Inc.: International congress and exposition, Cobo Hall, Detroit. Society's address: 485 Lexington Ave., New York 17. N. Y. Secretary: Joseph Gilbert.



AT UNIVERSAL-CYCLOPS' NEW COSHOCTON PLANT:

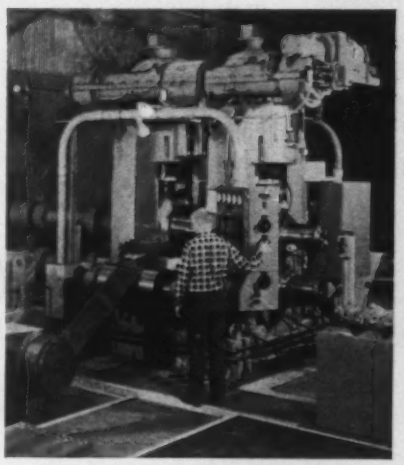
Stainless gets a fine finish fast

All the rolling at Universal-Cyclops Steel Corporation's new stainless strip finishing plant at Coshocton, Ohio, is accomplished on two rolling mills designed and built by Bliss' Rolling Mill Division. Steels rolled include all standard AISI grades in widths up to 24 inches.

Workhorse of the two mills is the 4-high reversing mill shown above. It is ruggedly built to stand heavy rolling stresses developed at speeds as high as 1000 fpm. Auxiliary equipment includes a three-stop coil entry ramp, coil buggy and mandrel-type payoff reel, flattener and feed roll, tension reels and coil buggies.

The two-high Bliss temper mill (right) is used principally for straight chromium grades of stainless providing proper hardness and a lustrous finish to the strip. An unusual design feature is the absence of an entry guide box, eliminating a source of dirt accumulation and strip scratching.

These two mills at Universal-Cyclops are typical of the modern approach to rolling mill design you'll find at Bliss. For other examples of our work, write us today for your complimentary copy of the 84-page Bliss Rolling Mill Brochure, Bulletin 40-B.



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SINCE 1857

Bliss is more than a name... it's a guarantee

E. W. BLISS COMPANY, Rolling Mill Division, Salem, Ohio

Subsidiary: The Matteson Equipment Company, Inc., Poland, Ohio

Geared...

for customer accommodation

Design and Delivery; Production Scheduling; Sales and Service; Engineering and Research; in every phase of our entire operation, our efforts are specifically primed for customer satisfaction.

And although Landis maintains the world's largest operation in its field, we know that size alone does not necessarily insure customer satisfaction. We know that adequate inventories, delivery when promised, service when needed, skilled engineering, continuous research, precision tools and machines, and personnel who really care are things that Landis' customers want, need, and expect. That's why we've set up our operation to supply those needs —supply them better, faster, more efficiently. And that's why Landis, with more than 50 years experience in designing, building, and servicing Threading Equipment, has become the acknowledged leader in its line.

If you are faced with the need of additional equipment for expanded threading operations, or new operations that require specialized design and engineering, or any problem concerning threading equipment or service—call LANDIS.

LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA • U. S. A.

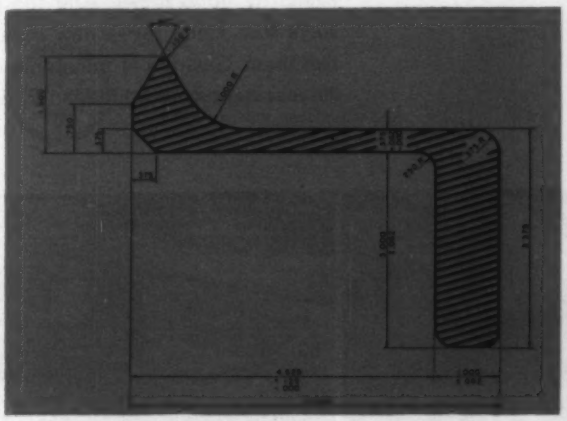
569

CONNORS special sections at Yale...

"We've had quality at cost savings ever since we pioneered with Connors Special Sections," says Mr. R. G. Ochsner, Director of Materials, Yale Materials Handling Division, The Yale & Towne Manufacturing Company.

"Fifteen years ago Connors came to us with a new process of hot rolling special sections for our industrial lift trucks masts," says Mr. Ochsner. "The Connors' Special Sections not only met our stringent specifications of strength and tolerances but provided a cost reduction over the cold drawn sections we had been buying.

"In addition, we found that the Connors Mill has the flexibility to handle the varied mast requirements our complete lift truck line demands. We could order the quantities we wanted thus avoiding excessively large inventories."



Yale's Design Engineers were concerned with possible bucking of the web in the channel of their largest truck mast assembly. Connors furnished two half sections to be continuously welded in the center. The knob furnished sufficient surface to insure a perfect weld and acted as a stiffening rib without the necessity of wasting steel where it is not needed.

Connors engineers can give you real help in the use of special sections.

For illustrated brochure or consultation
Write or call Connors — Specialists in Special Sections

CONNORS STEEL DIVISION, P. O. BOX 118C
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CONNORS STEEL DIVISION **PORTER** ***H.K. PORTER COMPANY, INC.***

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

OUTSIDE...

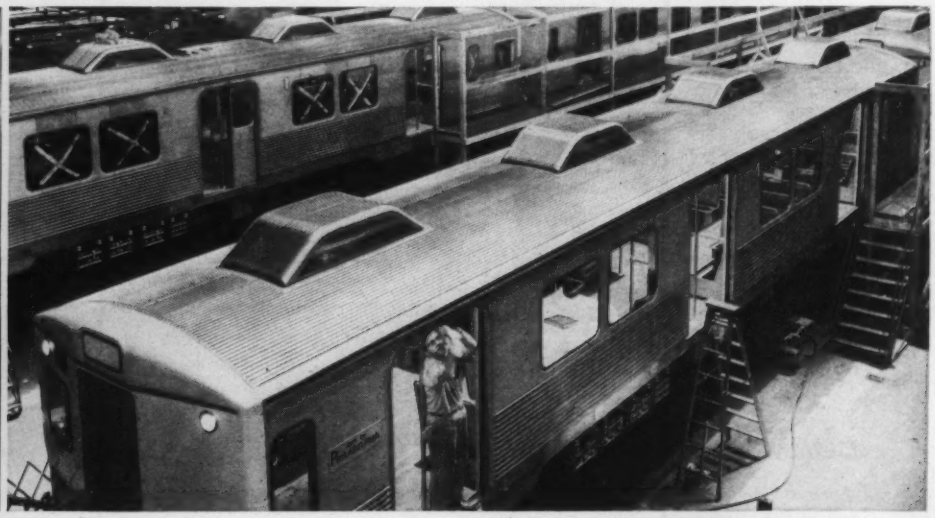
It's literally true that Stainless Steel trailers do not wear out before they become obsolete. Some of them have logged over a million miles. Once, a load of lampblack in a Stainless trailer caught fire and burned for five hours. Wheels, bearings, brake linings, drums (and cargo) were completely destroyed. They were replaced and the trailer body is still in service.

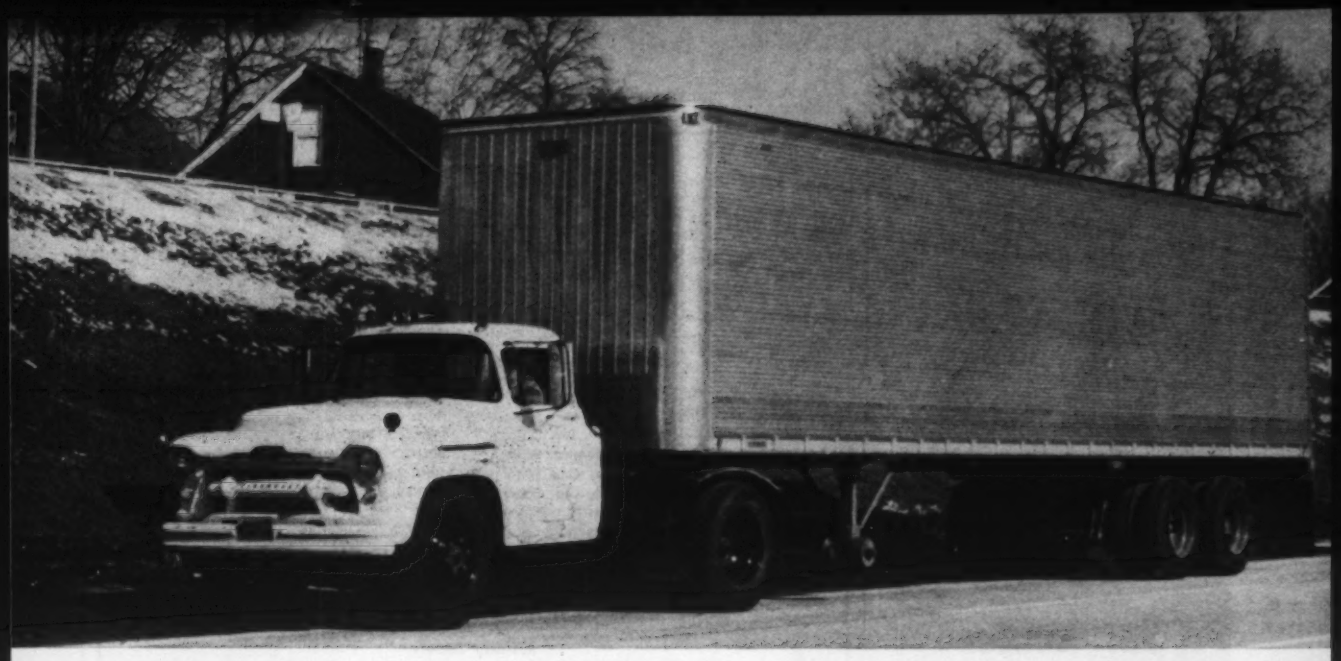
Water, harsh marine or industrial atmospheres can corrode and rot trailer bodies of other materials. Not Stainless. And Stainless Steel is strong—it has a yield point almost four times greater than competitive materials, so Fruehauf engineers (who designed this trailer) can design thinner, lighter walls, roof and braces. Strength goes up, and so do payloads and profits. Maintenance costs go down. The trailer shown here is 40 feet long, is built of type 302 Stainless, and is the strongest, lightest trailer in its class.

INSIDE...

In Philadelphia, 270 sleek new Stainless Steel subway-elevated cars are in process of going into service, with more than 100 already running. Manufactured by The Budd Company of types 201 and 202 Stainless, they were designed to win new riders to mass transportation, yet they will be cheaper to operate and maintain than any similar rapid transit cars ever built.

These cars will be exposed to all kinds of atmospheres—from the dampness of the underground tunnels to the sleet, rain, snow or hot sun above ground. But they'll always look new and shiny—because they're Stainless Steel. A quick hosing-down will keep them looking that way, and costly painting will be eliminated because Stainless Steel keeps its good looks. And the Philadelphia Transportation Company will save in other ways too: since these new cars weigh only 49,000 lbs., it won't take as much power to run them. Savings in maintenance and operation will add up to some $6,500,000 over the 30-year depreciated lifespan of the fleet.





...and in between

Only Stainless Steel offers designers and fabricators this unique combination of properties: great strength, extraordinary corrosion resistance to an enormous variety of reagents, outstanding high temperature properties, and good appearance. It is easily fabricated, and it actually costs less in the long run because it lasts longer. For unmatched efficiency, durability, ultimate economy, specify Stainless Steel. For a wide selection of Stainless Steels and for prompt delivery ask your USS representative or nearest steel service center.

USS is a registered trademark

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American Steel & Wire – Cleveland
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United States Steel

This mark tells you a product is made of modern, dependable Steel.

Watch United States Steel's special Christmas show, **The Coming of Christ,** in Color on NBC-TV, Wednesday, December 21, 8:30 P.M., E.S.T.

Stainless Steels . . . no other metal makes such a material difference in so many applications

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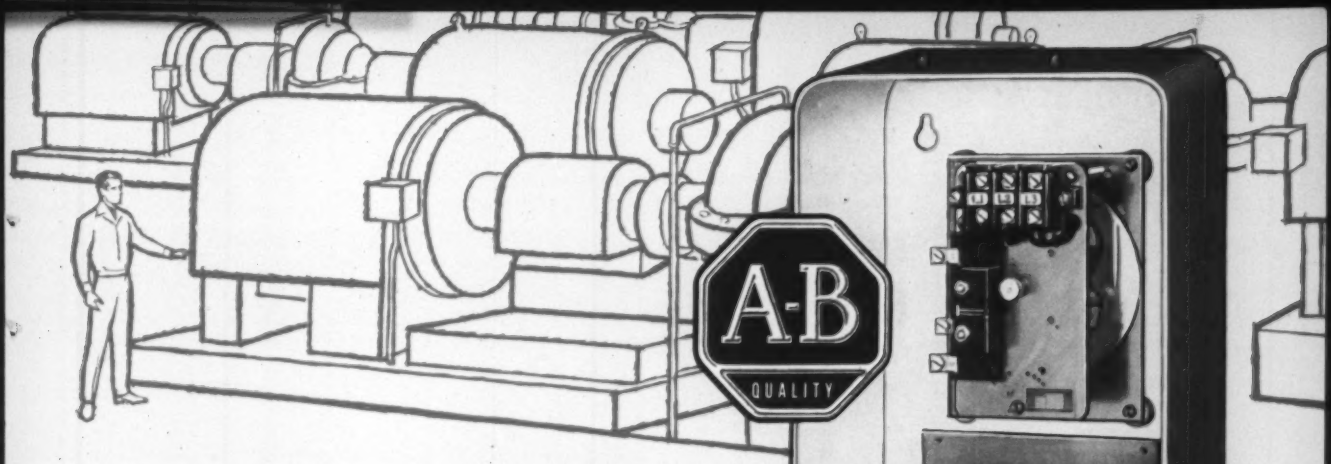


ALLEN-BRADLEY PHASE FAILURE *and* PHASE REVERSAL RELAYS

will provide positive protection for high-horsepower, high-priced motors!

It's sound "economy" to guard your investment in expensive motors and equipment against the extensive damage that can result from a phase failure or phase reversal. Allen-Bradley's Bulletin 812 Style RF relay provides *complete, positive* protection against both of these hazards.

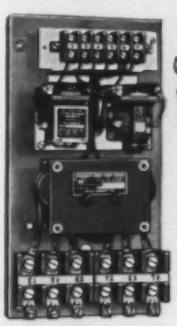
The Bulletin 812 Style F phase failure relay instantly detects *all* open phase conditions on a motor branch circuit and removes the motor from the line—yet is not subject to nuisance dropouts from transient line fluctuations. An unusual feature of this Style F relay is its positive response, regardless of motor load or type of motor branch circuit employed.

The Bulletin 812 Style R phase reversal relay disconnects the motor from the line—whether it is running or not—when a phase reversal occurs on the line side of the relay. Thus, it can be used to protect a single motor or a group of motors. Furthermore, the Style R relay removes the motor from the line should a phase failure occur while the motor is stopped.

All A-B Bulletin 812 relays are completely "fail safe." It will pay you to investigate this economical insurance against the heavy losses that can—and *frequently* do—result from phase failure and phase reversal. Write today!

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

Bulletin 812 Style RF for Phase Failure and Phase Reversal consists of Style F Phase Failure and Style R Phase Reversal relays in the same enclosure.



Bulletin 812 Style F for Phase Failure

Bulletin 812 Style R for Phase Reversal

21-60-R

ALLEN-BRADLEY

Member of NEMA

Quality Motor Control

NOTICE!

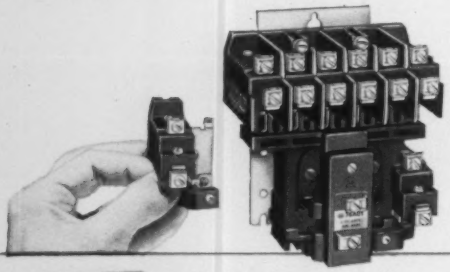
60 Second Contact Convertibility

ALLEN-BRADLEY CONTROL RELAYS

can thus easily be changed from N.O. to N.C. (or vice versa)

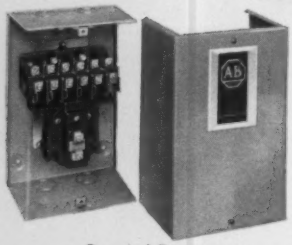
Why not give yourself a real surprise! We refer to the ease with which you can convert the contacts of these Allen-Bradley Bulletin 700 Type BR control relays. Using only a screwdriver, contacts can be changed from normally open to normally closed (or vice versa) in seconds—without removing the relay from its mounting—or its wiring. This "on-the-spot" convertibility certainly suggests an appreciable moneysaving reduction in your relay inventories.

Extensive tests have proven conclusively that the Bulletin 700 Type BR relays are good for many—and we mean *many*—millions of trouble free operations. A "built-in" permanent air gap completely eliminates all possibility of magnetic sticking. Naturally, the double break, silver contacts never need attention. Also, the molded coil is your assurance that even the most severe atmospheric conditions cannot cause trouble. Please write for full details on these relays today!

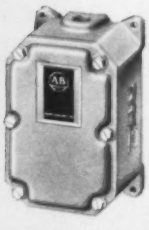


BUT HEAR THIS!

In the event that when "on-the-job" it is discovered that something was either overlooked or added, the standard Bulletin 700 Type BR — either 2, 3, 4, or 6 pole relay — can easily have added to its base, out in the field, either one or two switching poles. It is done as easily as "falling off a log."

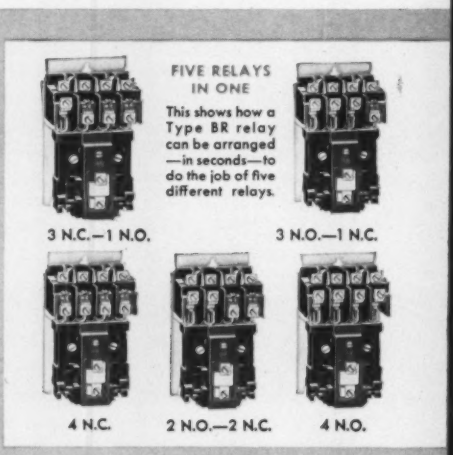


General-Purpose
NEMA 1



Explosion-proof
NEMA 7

Waterproof
NEMA 4


FIVE RELAYS IN ONE
This shows how a Type BR relay can be arranged —in seconds—to do the job of five different relays.
3 N.C.—1 N.O.
3 N.O.—1 N.C.
4 N.C.
2 N.O.—2 N.C.
4 N.O.

21-60-R

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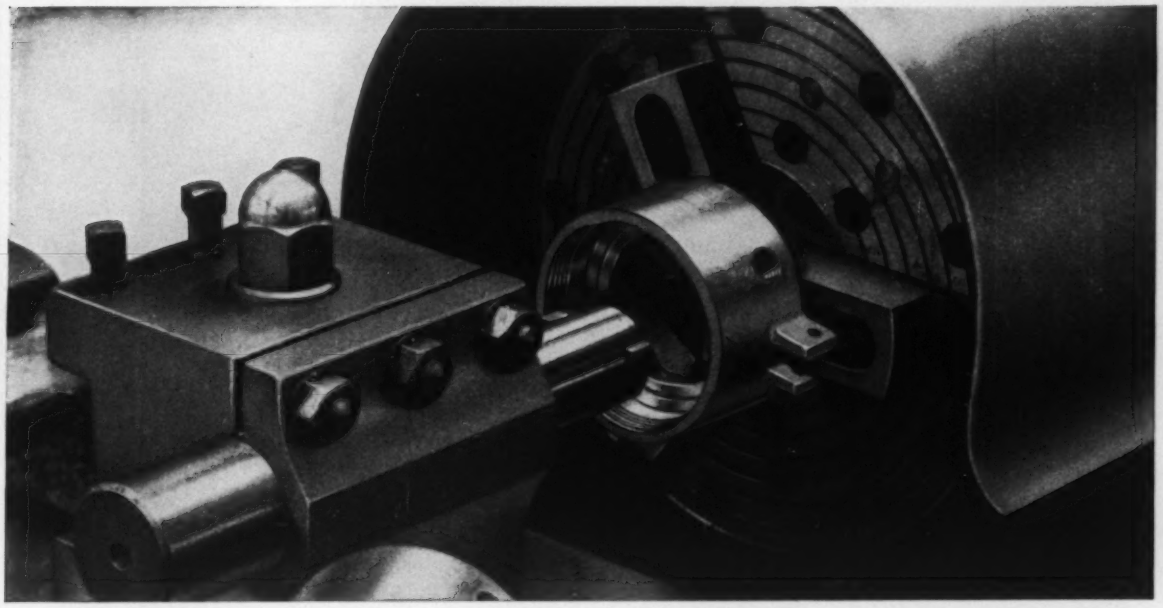


Threaded in just 6 seconds on a Gisholt CRI-DAN

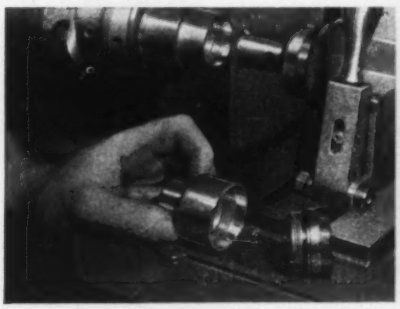
Here's a good example of what you can do on a Gisholt CRI-DAN Threading Lathe—an internal thread, 2 3/16" diameter x 1/4" long, 12 t.p.i., cut in a phosphor-bronze bearing housing in just six seconds.

Speed and versatility obsolete other methods.

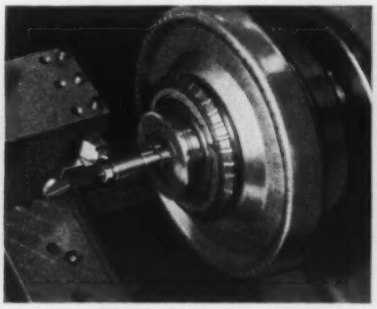
Note the other jobs shown—the variety of work and the fast threading times. Simple on a CRI-DAN—yet, each presented problems that could only be solved at high cost using any other method.

It's Cri-Dan for highest quality, lowest cost.

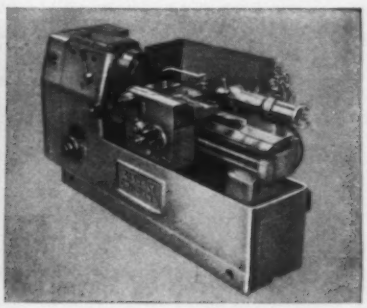
The jobs shown here prove that close tolerance and high-quality finish requirements are met easily on the CRI-DAN. The CRI-DAN method, using an inexpensive single-point carbide tool, is faster and less costly than thread grinding or thread milling.



20 seconds—Zoom operating sleeve for movie camera; aluminum; I.D. pilot dia. bored; tool indexed for threading a 2-start, .0625-pitch, .125"-lead, Class 4 16NS thread in the 1.610" center section.



15 seconds—spinning roller; stainless steel; 18 t.p.i. thread on 3/4" diameter for 7/8" length.



GET THE FACTS—NOW! Two models are available—both are capable of handling high-production work or a wide variety of short-run jobs. Change-over averages ten minutes. Write for our catalog—or ask your Gisholt Representative for complete details.

GISHOLT® MACHINE COMPANY
Madison 10, Wisconsin

Investigate Gisholt's Extended Payment and Leasing Plans

MMT=PE

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • *Factory-Rebuilt Machines with New-Machine Guarantee*

Three Reasons General Electric D-c Drives are Best for

1. Costly Maintenance Shutdowns Reduced

D-c Main Drives

In metal-rolling mills—where minutes of downtime are measured in thousands of dollars—fast, simplified maintenance of main drive motors is critical.

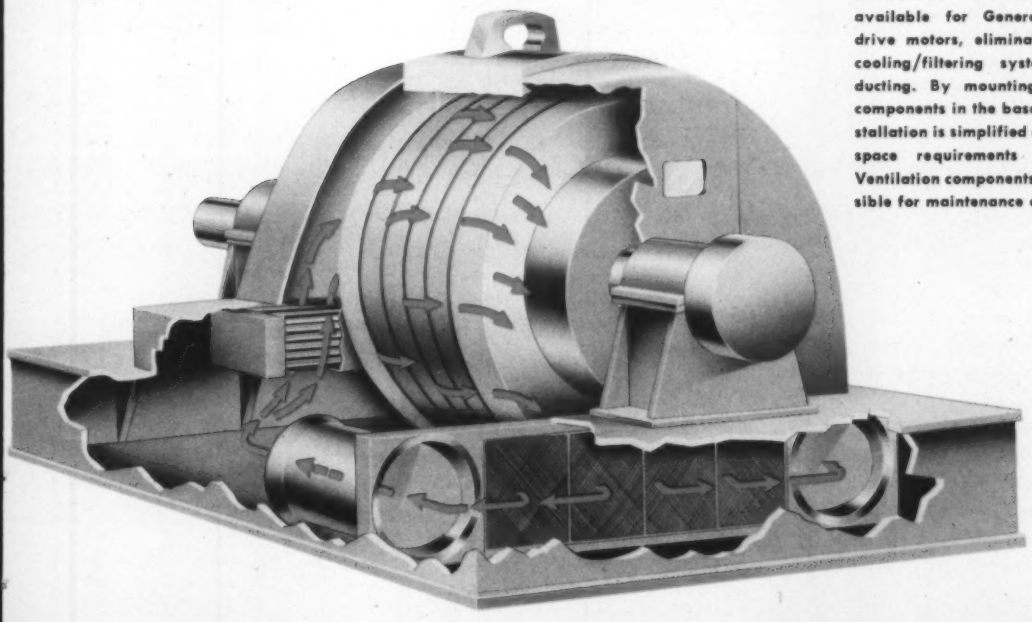
The revolutionary "TOP-FORWARD" twin-drive shown above exemplifies General Electric's continuing emphasis on better design for ease of maintenance. Shaft extension of the rear motor passes *beneath* the forward motor instead of directly over as in conventional designs. This unique drive arrangement allows clear access by overhead crane to all bearings, air-shields and other components of *both motors*.

Shorter over-all length of drive substantially reduces space required and provides cost savings in foundation construction. Improved Class B Insulation system for armatures and fields, utilizing proven resins and compounds, provides greater resistance to heat, moisture and dirt.

Progress Is Our Most Important Product

GENERAL ELECTRIC

by New Advances in D-c Drive Design

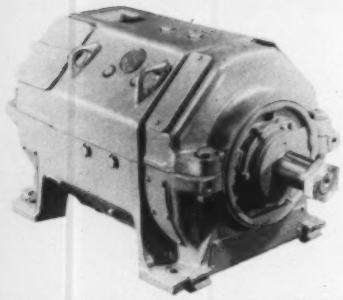


INTEGRAL VENTILATION SYSTEM, **available for General Electric main drive motors, eliminates separate air-cooling/filtering system and related ducting. By mounting all ventilation components in the base of the drive, installation is simplified and supplemental space requirements are eliminated. Ventilation components are easily accessible for maintenance and inspection.**

Three Reasons General Electric D-c Drives are Best for

2. G-E Drives Are Durable and Reliable—

D-c Auxiliary



GENERAL ELECTRIC'S MD-600 ARMORED MOTOR is built to withstand severe shocks, give maximum reliability. Class H insulation provides superior protection—permits greater work capacity.

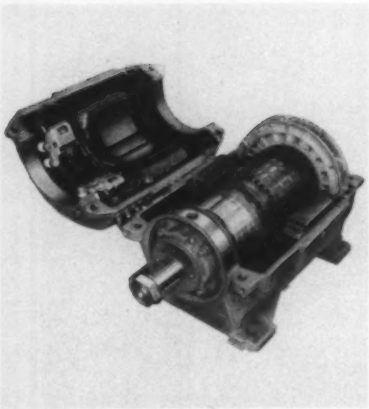
Designed to exceed the requirements of the most advanced continuous processing systems, General Electric MD-600 series armored mill motors are built to withstand regular exposure to hot scale, steam and corrosive sprays. Improved high temperature insulations have appreciably lengthened motor life.

Designed to meet or exceed AISE standards in all respects, General Electric's armored motor offers unmatched flexibility. This motor can be adapted to fit any of five different ventilation requirements simply by adding or removing standard covers. No other modifications are necessary.

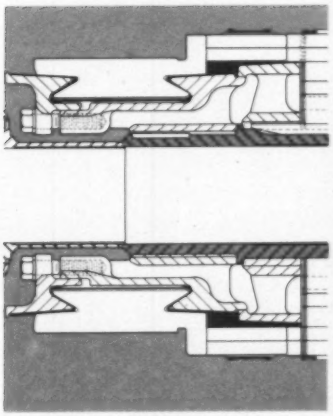
Progress Is Our Most Important Product

GENERAL ELECTRIC

Meet Demands of Continuous Processing



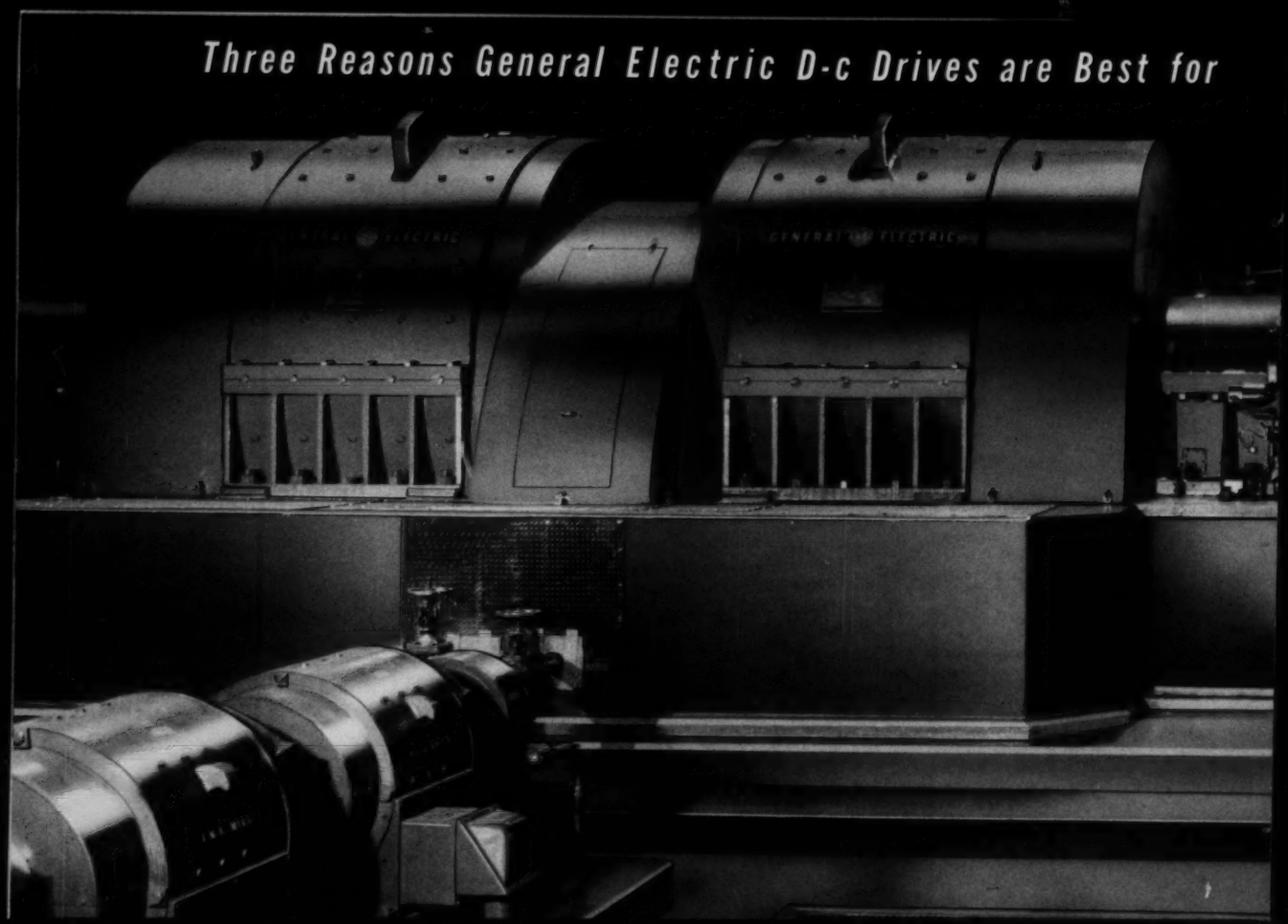
DESIGNED FOR EASY ACCESS, top half of General Electric MD-600 motor frame swings open nearly 180° to permit fast armature removal. Positioning keys in frame heads facilitate armature alignment.



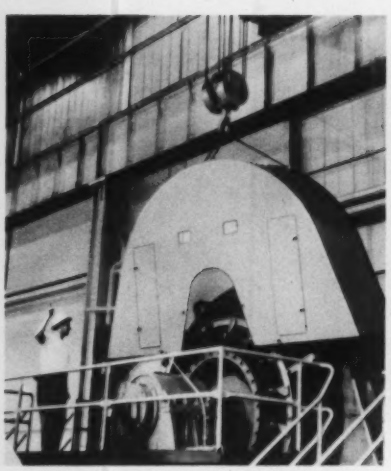
DESIGNED FOR EASE OF MAINTENANCE, the armature on General Electric armored motors is assembled on a steel spider so the shaft can be pressed out without disturbing commutator or windings.

BUILT TO DRIVE HEAVIER LOADS—accelerate, start, stop and reverse faster—MD-600 motors meet toughest demands of automated systems. Integral feet on the endshields allow the armature to stand alone when removed from frame.

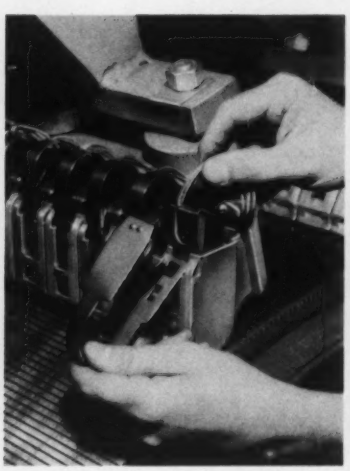
Three Reasons General Electric D-c Drives are Best for



3. G-E Drives Give You New Competitive



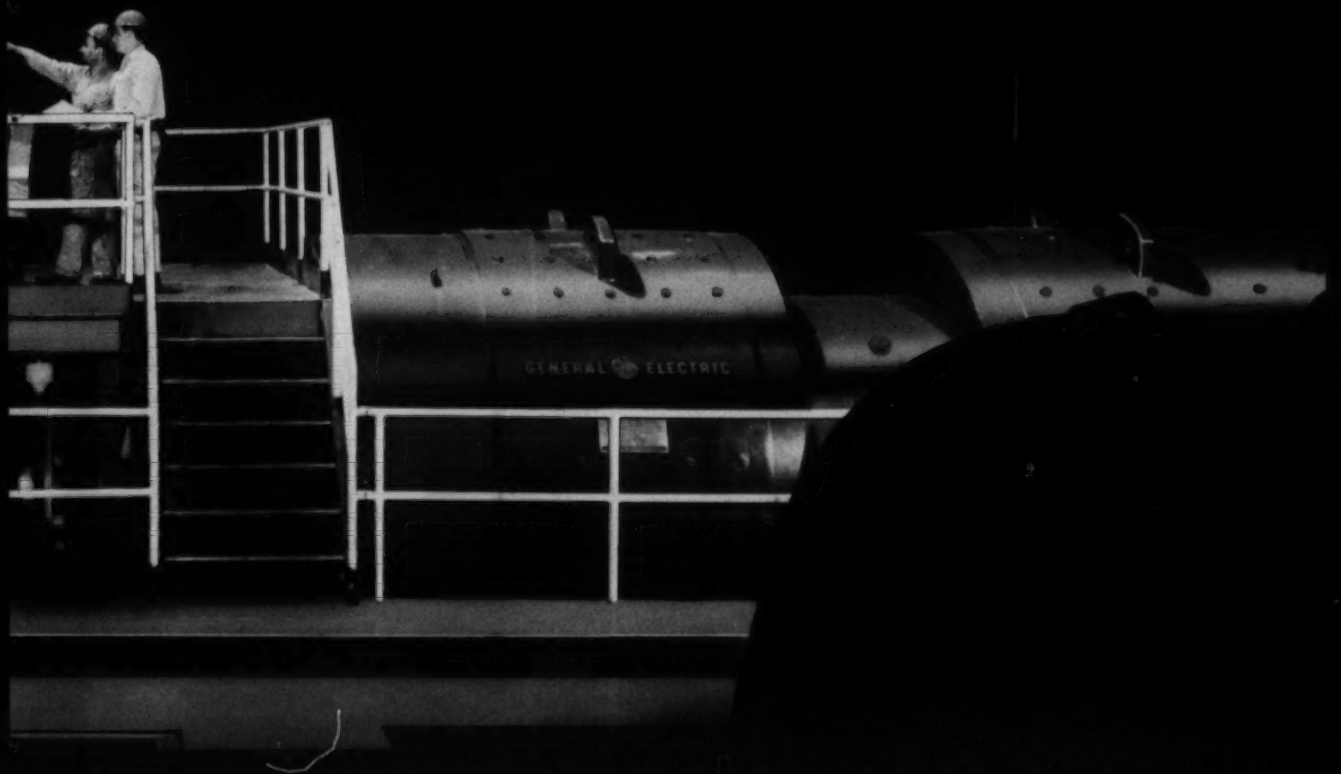
NEW QUICK-REMOVABLE COVERS use no bolts, permit easy access. Tapered guide pins, attached to "TOP-FORWARD" d-c main drive motor frame, accurately position covers on base and frame. Removal and replacement time is reduced to a minimum.



CONSTANT-PRESSURE BRUSH-HOLDERS eliminate all pressure adjustments, give optimum contact at all times. General Electric brush-holder design permits observation of brush wear. Brush can be replaced in seconds.

DISC-LUBRICATED BEARINGS provide positive oiling during all operating conditions. Self-aligning, cast-steel, babbitt-lined bearings can be removed without disconnecting oil piping—maintenance is simplified.

Automated Production Systems



Advantages to Meet the Challenge of the 60's

Higher processing speeds, tighter production schedules and better product quality are requisites of industrial growth in the coming decade. As continuous processing and automation techniques spread throughout industry, rapid maintenance of basic equipment becomes an increasingly important competitive advantage.

General Electric's simplified-maintenance drive design gives you this advantage plus the high thermal and mechanical limits and improved commutation demanded of automated processes.

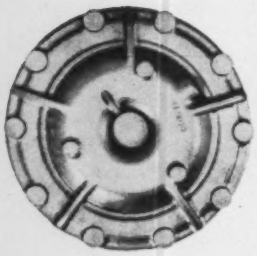
Let your G-E Sales Engineer show you how easily new d-c main and auxiliary drives can fit into your modernization plans, improve operating efficiency and help you meet the challenge of the '60's. For descriptive information on d-c motors for heavy industry, write Section 772–9, General Electric Co., Schenectady 5, N. Y. *Large Motor & Generator Dept., Schenectady, N. Y./Direct Current Motor & Generator Dept., Erie, Pennsylvania.*

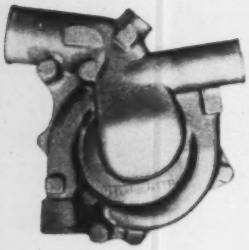
Progress Is Our Most Important Product

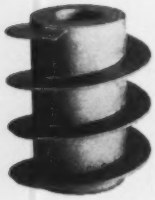
GENERAL ELECTRIC

D-c Main & Aux. Drives

lower production costs with Decatur quality castings





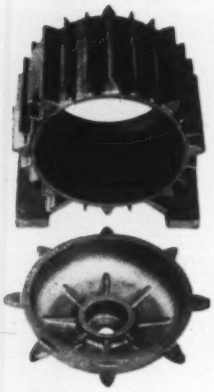


In the highly competitive field of gray iron castings, buyers constantly seek greater reliability at lower cost. They lower costs by using castings which require minimum finishing and have the lowest rejection rate.

Decatur Quality Castings® have exceptionally smooth surface finish comparable to shell or permanent mold castings. When required, precisely controlled heat treating in our furnace gives these castings the uniform metallurgical properties necessary for high production machining. Preparation of unmachined areas is usually unnecessary.

Decatur castings are shipped to your plant in our trucks when quantities permit to insure prompt service.

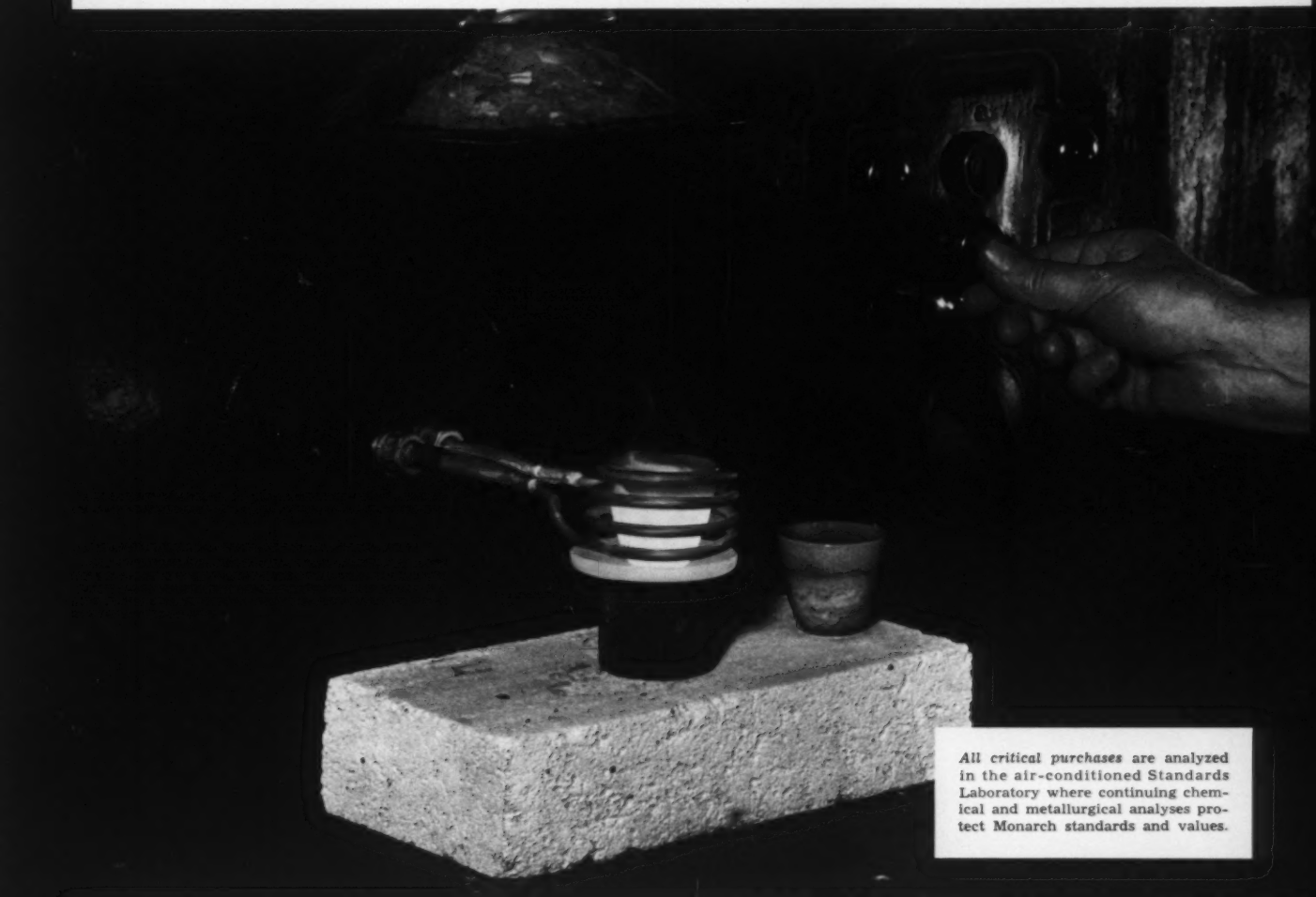
We are light gray iron and alloyed iron specialists supplying castings weighing a few ounces to 100 pounds.



THE DECATUR CASTING CO.

Decatur Quality Castings® Light Gray Iron and Alloyed Iron Specialists
Decatur, Indiana • Phone: Decatur 3-2700

He's making a Monarch Lathe...



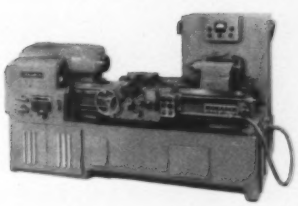
All critical purchases are analyzed in the air-conditioned Standards Laboratory where continuing chemical and metallurgical analyses protect Monarch standards and values.

One example of where the extra values come from—in your MONARCH Lathes

When we tell you that we can set up your job on modern Monarchs in our Turning Clinic, and then show you important production increases, vastly improved finish and longer tool life—then, we'd better have the lathes to do it.

Have we? Consider the casting control test shown here. Our own process, it keeps our metallurgical engineers constantly alert to any casting deviation from our quality standards—and ready to pass along to our foundries the results of our own research. Every lathe bed, large carriage and slide is cast with a test-log which we analyze for hardness, micro-structure and chemical composition.

This is only one of many Monarch continuing quality control and research analyses. Their sum total, plus advanced engineering, plus meticulous manufacturing, is the modern Monarch—with its intrinsic, often exclusive values, the ultimate in lathe bargains. *So we repeat our invitation. Date?* THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO



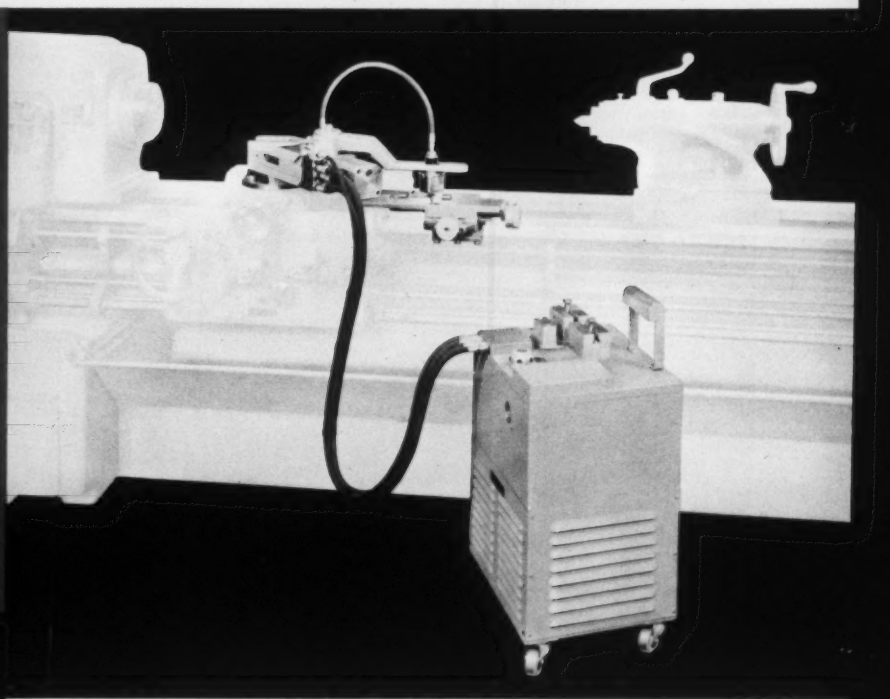
WHEN YOU BUY VALUE
MONARCHS COST LESS

Monarch
TURNING MACHINES

VISIT MONARCH—*We'll turn your part to return you profit*

Monarch's Building Higher Production for Tomorrow's Boom

THE LATHE ON YOUR FLOOR WILL PRODUCE MUCH MORE



3..The New Air-Tracer Pak... Portable Unit for Standard Monarchs in Your Plant

Here's a real turning technique breakthrough! The Air-Tracer Pak is just what the name implies—a portable, easily applied device for temporarily or permanently adding to many standard Monarchs in your shop *all the advantages of Air-Gage Tracer production.*

And what are those advantages? In a nutshell, this, the most accurate duplicating method in general use, always outproduces manual operation up to 8 to 10 times. It sizes automatically and, using only a single running tool, is ideal for *small lot repetitive work* without the need for expensive form tools or multiple tool setups.

Its accuracy of ± .001" on most work often cuts in half the stock left for grinding; sometimes eliminates grinding and polishing. It allows complete setup change in as little as 15 to 20 minutes and tool change in 1 minute. It is also the simplest, most trouble-free of all lathe duplicating units.

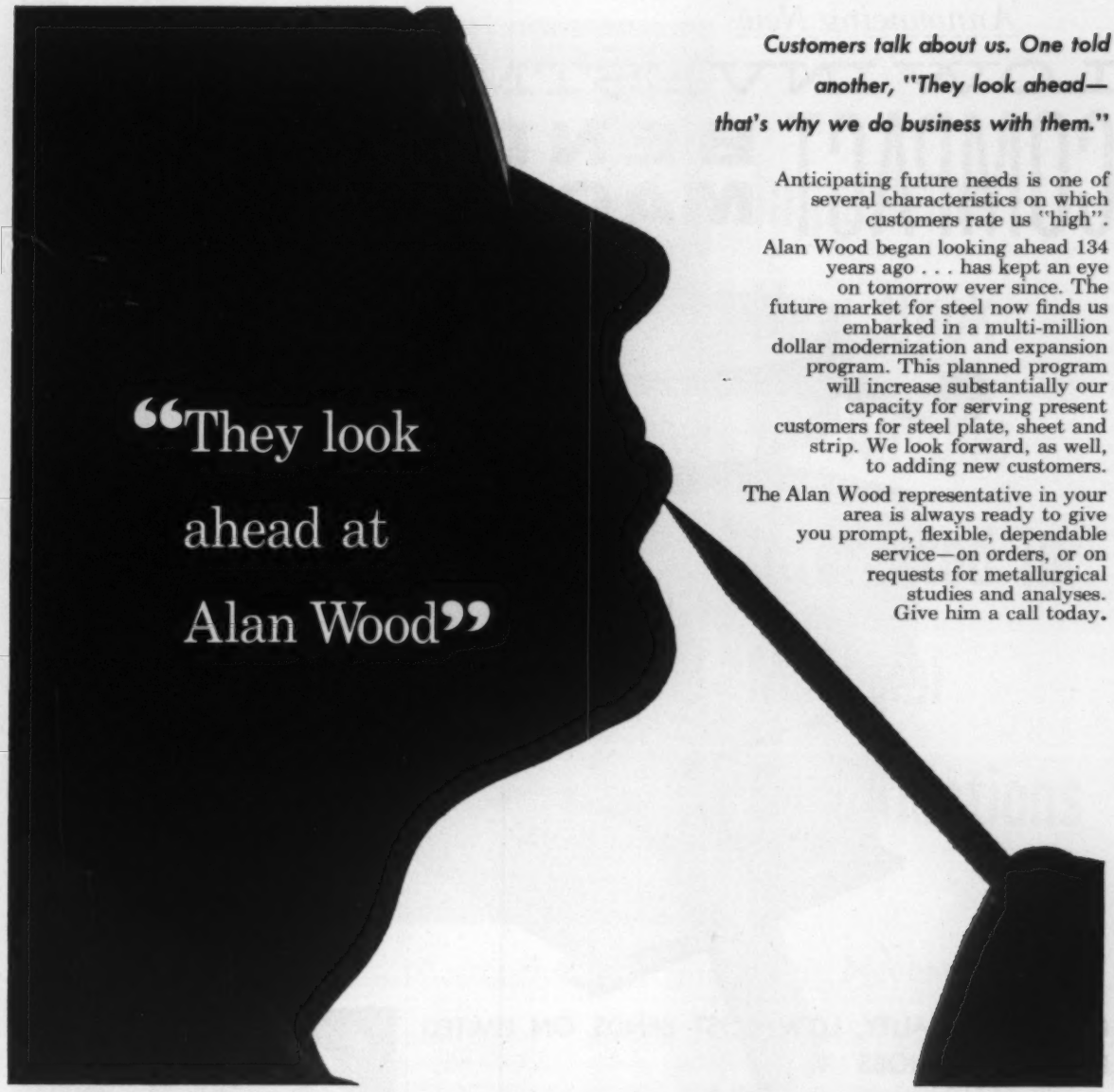
The photos show how the tracer slide assembly quickly replaces the regular compound rest on the cross slide. Note the template support and micrometer dials—the portable, completely self-contained power unit at the front of machine with air supply and electrical connections in the base.

Presto! it's on. And presto! it's off. Yet it's an adaptation of the time-tested swiveling Air-Gage Tracer with the versatility to handle the more complex turning, boring and facing jobs.

This is news! Write—or phone today—for the full story... The Monarch Machine Tool Company, Sidney, Ohio.

Monarch
TURNING MACHINES

IF IT CAN BE TURNED, THERE'S A MONARCH TO DO IT BETTER AND FASTER



Customers talk about us. One told another, "They look ahead—that's why we do business with them."

Anticipating future needs is one of several characteristics on which customers rate us "high".

Alan Wood began looking ahead 134 years ago . . . has kept an eye on tomorrow ever since. The future market for steel now finds us embarked in a multi-million dollar modernization and expansion program. This planned program will increase substantially our capacity for serving present customers for steel plate, sheet and strip. We look forward, as well, to adding new customers.

The Alan Wood representative in your area is always ready to give you prompt, flexible, dependable service—on orders, or on requests for metallurgical studies and analyses. Give him a call today.

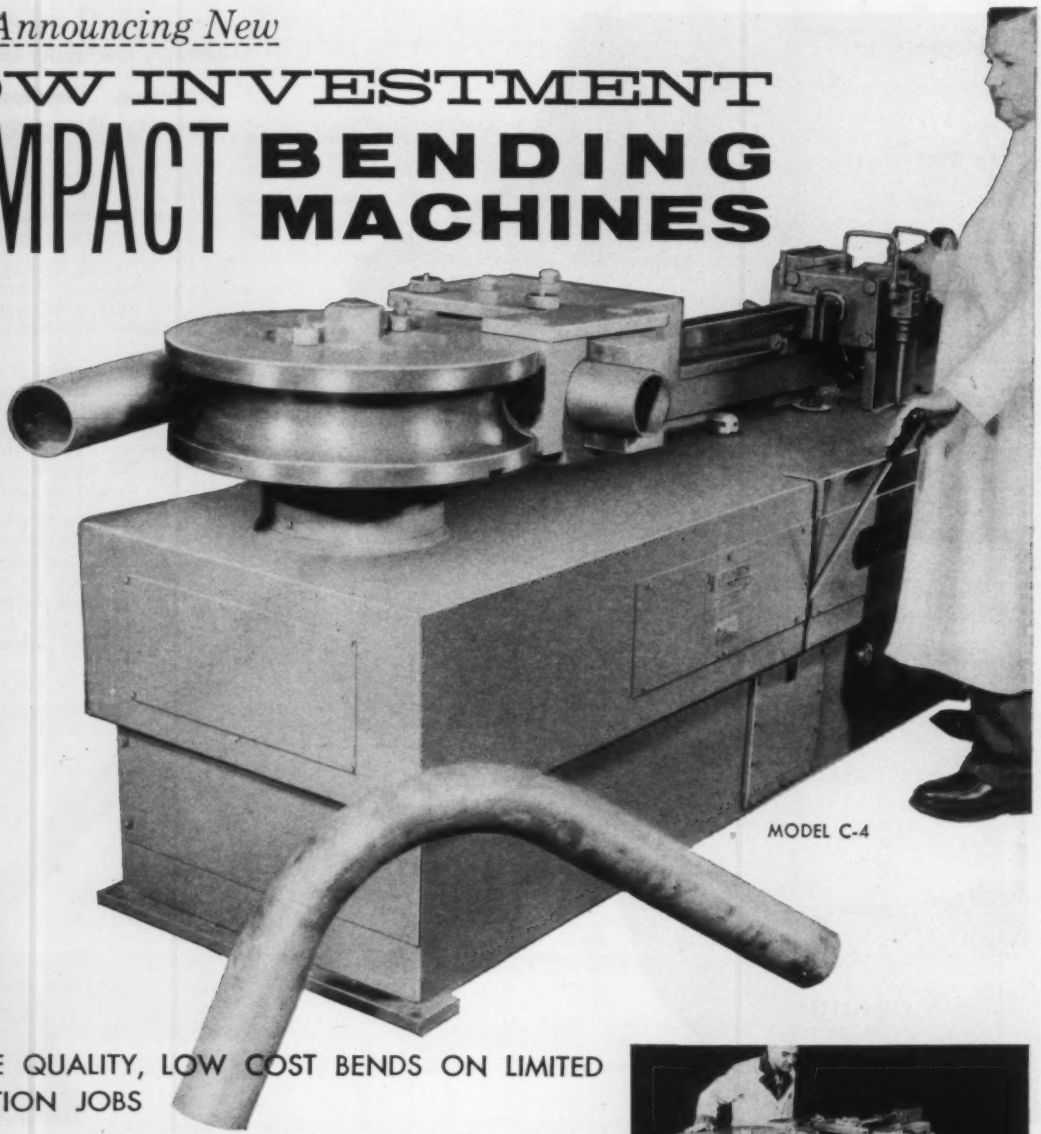
ALAN WOOD STEEL COMPANY

Conshohocken, Pa. • **STEEL PRODUCERS WITH THE CUSTOMER IN MIND**

DISTRICT OFFICES AND REPRESENTATIVES: Philadelphia • New York • Los Angeles • Boston • Atlanta Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada: A. C. Leslie & Co., Limited

Announcing New

LOW INVESTMENT COMPACT BENDING MACHINES



MODEL C-4

PRODUCE QUALITY, LOW COST BENDS ON LIMITED PRODUCTION JOBS

The new Pines COMPACT Bending Machines are especially designed for low production jobs, one-of-a-kind or experimental parts, maintenance or similar work where the high output of other Pines machines is not necessary. Representing a low initial investment, COMPACT machines are easily and inexpensively tooled to bend structural shapes, solid stock, and rolled or extruded sections as well as pipe and tubing.

Light in weight for practical portability and simplified in design for maximum ease of operation and set up, this complete line of machines incorporates rugged construction and hydraulic operation to assure good quality bends with close tolerances at low cost. Find out how COMPACT Machines offer a practical answer to quality limited production bending.

MODEL C-4
Capacity up to 4" I.P.S. standard pipe... Floor space 3'x11'... weight 6300 lbs.

MODEL C-2
Capacity to 2" I.P.S. standard pipe... Floor space 2'x7'... weight 2400 lbs.

MODEL 1400
Capacity to ½" I.P.S. standard pipe... Floor space 4'x8'... weight 1400 lbs.

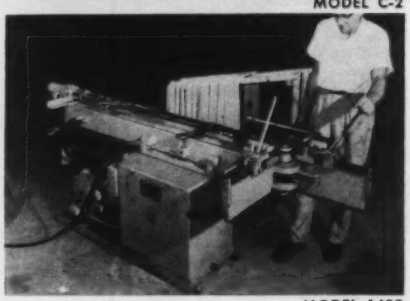
WRITE TODAY FOR COMPLETE INFORMATION

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

665 WALNUT • AURORA, ILLINOIS

MODEL C-2



MODEL 1400

Important New Book for Anyone Interested in Material Specifications

Contains 68 pages of engineering facts about Meehanite®.

This technical book has been prepared for designers, engineers and purchasing executives who strive to improve product performance and reduce manufacturing costs. It presents the physical properties of each of the 26 types of Meehanite metal available and is jam-packed with data that makes it easier for the materials engineer to evaluate and specify the most suitable metal for his casting application. Included are heat treatment and machining data and numerous photographs of typical applications. For your free single copy see one of the Meehanite foundries listed below or write *Meehanite Metal Corporation, 714 North Avenue, New Rochelle, New York.*

MEEHANITE METAL

The American Laundry Machinery Co., Rochester, N. Y.
Atlas Foundry Co., Detroit, Mich.
Banner Iron Works, St. Louis, Mo.
Barnett Foundry & Machine Co., Irvington, N. J.
Casting Service Corp., LaPorte, Indiana and Bridgman, Michigan
Centrifugally Cast Products Div., The Shenango Furnace Co., Dover, Ohio
Crawford & Doherty Foundry Co., Portland, Ore.
Dayton Casting Co., Dayton, Ohio
Empire Foundry Co., Tulsa, Okla.
Florence Pipe Foundry & Machine Co., Florence, N. J.
Fulton Foundry & Machines Co., Inc., Cleveland, Ohio
General Foundry & Mfg., Flint, Mich.
Georgia Iron Works, Augusta, Ga.
Greenlee Foundries, Inc., Chicago, Ill.
Hamilton Foundry Inc., Hamilton, Ohio
Johnstone Foundries, Inc., Grove City, Pa.
Kanawha Manufacturing Co., Charleston, W. Va.
Kennedy Van Saun Mfg. & Eng. Corp., Danville, Pa.
Lincoln Foundry Corp., Los Angeles, Calif.
Love Brothers — Pyott Foundry & Machine Div. Mueller Ind. Inc., Aurora, Ill.
Oil City Iron Works, Corsicana, Texas
Palmyra Foundry Co., Inc., Palmyra, N. J.
The Henry Perkins Co., Bridgewater, Mass.
Pohlman Foundry Co., Inc., Buffalo, N. Y.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Ross-Meehan Foundries, Chattanooga, Tenn.
Sonith Foundries of FMC, Indianapolis, Ind.
Standard Foundry Co., Worcester, Mass.
The Stearns-Roger Mfg. Co., Denver, Colo.
Vulcan Foundry Co., Oakland, Calif.
Washington Iron Works, Seattle, Wash.
Dorr-Oliver-Long, Ltd., Orillia, Ontario
Hartley Foundry Div., London Concrete Machinery Co., Ltd., Brantford, Ontario
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MEEHANITE METAL CORPORATION, NEW ROCHELLE, NEW YORK

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DENISON HydrOILics

16 different **VICTOR ADDING MACHINE** cases perforated without tooling changes, demonstrates **DENISON** Multipress...

VERSATILITY

PERFORATING *16 different plastic case designs without tooling changes, this 8-ton Denison Multipress reduces inventory requirements and speeds production for Victor Adding Machine Company, Chicago. Typical case after punching, shown at left.*

SHARPLY REDUCED inventory requirements, no scrap loss and production line versatility are just 3 of the important advantages gained with this Denison hydraulic Multipress at Victor Adding Machine Company.

Previously, stocks of at least 6 different basic plastic shells had to be maintained to produce cases for 16 different models in the Victor Champion line.

Now, with an 8-ton Multipress equipped with special tooling and controls which enable the operator to select a variety of punching combinations automatically, only *two* basic shells are required in stock. And *all* of the 16 different case design variations are perforated on the Multipress *with no change of tooling.* And the right shell is always on the assembly line at the right time.

Smooth, controlled hydraulic power perforates the "Cycolac" plastic, without charring or discoloring. Holes are clean and smooth . . . there's no scrap loss . . . punch life is significantly longer. This operation at Victor Adding Machine is another case-in-point showing how Multipress versatility and usefulness can save time and money in *your* plant. Call in the nearby Denison Production Specialist to discuss how a **M**ultipress **A**nalysis **P**rogram can start to **MAP** production savings for you now.

DENISON ENGINEERING DIVISION
American Brake Shoe Company
1180 Dublin Road • Columbus 16, Ohio

HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

DENISON
HYDRAULIC MULTIPRESS

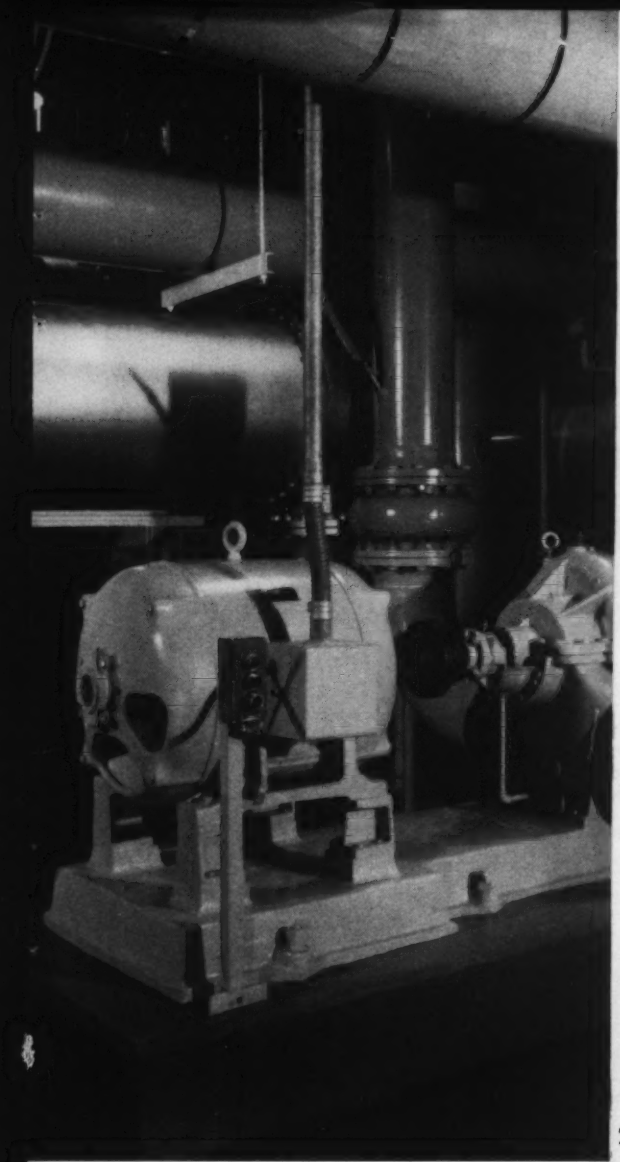
1.

CENTURY MOTORS ARE RIGHT FOR ANY PUMPING JOB

There is a service-proved Century motor for almost every industrial pump application—for centrifugal pumps, condensate pumps, chilled water pumps, reciprocating pumps and many more. Dependable Century motors have been performing outstanding pumping service for years in industrial plants, on farms, in power plants, in heating and air-conditioning units, and on hundreds of other demanding pumping applications.

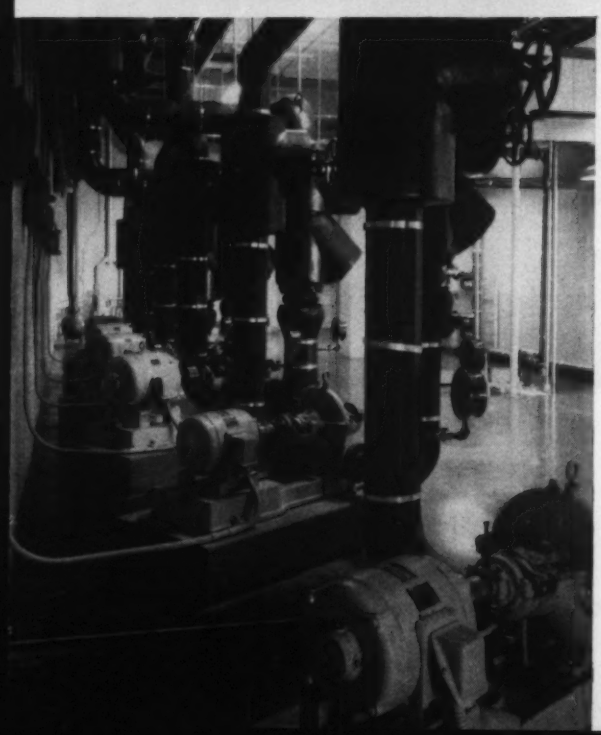
Century motors have the precise speed regulation important in pumping. And they are exceptionally well protected against dirt, dust, and the severe moisture conditions frequently found in most pump applications.

Century standard squirrel cage motors are shown on this page on typical pump applications at Exchange Park, Dallas, Texas' completely air-conditioned "City within a City".



2.

1. **Duplex condensate pumps driven by two Century squirrel-cage 5-horsepower motors. Pumps are in a pit where dust and dirt make motor ruggedness important.**



3.

2. **Century 75-horsepower squirrel-cage motor drives a condensate water pump.**

3. **Six chilled water pumps driven by a series of two Century 5-horsepower motors, two 15-horsepower motors and two 20-horsepower motors are in the power plant of this large commercial development site.**

Century motors on these three pump applications have been operating for years without service or maintenance problems—proof of Century motor dependability.

Century Electric application engineers have years of experience in applying the right motor to your job. Contact your nearest Century Electric sales office or authorized distributor for more information about dependable Century motors.

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

60-11

from the Udylite supplies network you get . . .

QUALITY. QUANTITY. SERVICE

world's largest plating supplier

udylite

From the moment your supplies order reaches Udylite it is subjected to a complex series of checks . . . to assure you of efficient service and fullest satisfaction.

We check for Quality—experienced personnel avert costly errors by questioning the order. This goes on through the order department, the teletype network and the warehouse until your order is finally placed aboard carrier. Even then, if need be, it will be followed by our experienced traffic department clear to its destination.

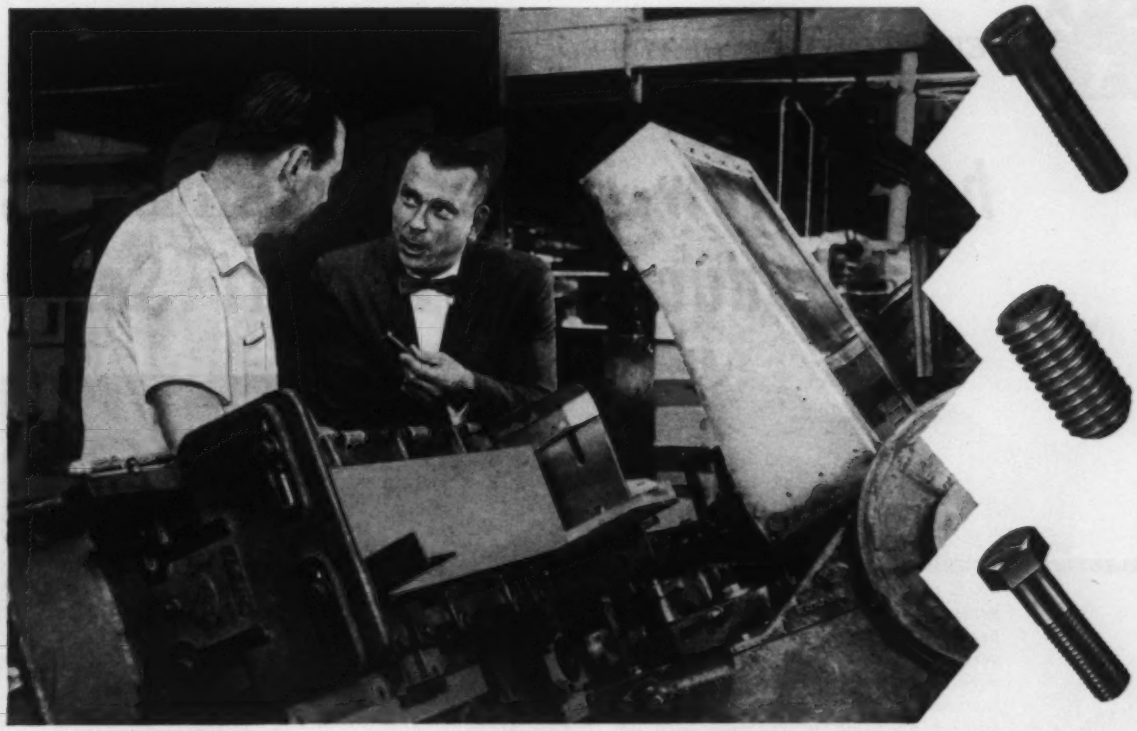
We check the Quantity—the size of your order will determine where it can best be filled at any one of 20 warehouses carrying Udylite supplies. Careful analysis here means important savings for you.

The same careful screening of your order takes place regardless of the quantity or dollar volume involved. Find out just how much you can benefit from this Udylite service...try it today.

the udylite corporation • detroit 11, michigan

on the west coast: L. H. Butcher Co.

IT PAYS TO STANDARDIZE ON **STANSCREW**



Stanscrew solves production problem, saves money for *Ball* closures

The specialized machines which every day turn out millions of jar tops, bottle caps, and other closures for Ball Brothers Company, Inc. must work to a very tight production schedule. Fastener failures in this equipment can be extremely costly.

One particular application was a real headache. Even specially designed fasteners failed time and time again. Ball's distributor then called in the Stanscrew fastener specialist. His recommendations included minor redesign, the use of a particular standard fastener from Stanscrew's complete selection, and detailed instructions on its application. This eliminated many production interruptions for Ball . . . for important savings.

Whether you need fasteners for the maintenance of important production machinery or as components of your finished product, you can often save money by standardizing on Stanscrew . . . as more and more industrial leaders are learning. Stanscrew offers a complete stock of 5,500 different standard fasteners . . . produced to the highest quality standards made possible by American technology . . . to provide economical answers for the overwhelming majority of all industrial fastener requirements.

The suggestions and technical assistance of the Stanscrew fastener specialist may result in significant savings in your assembly and maintenance costs. Your local Stanscrew distributor will be happy to arrange a prompt visit. Call him today.

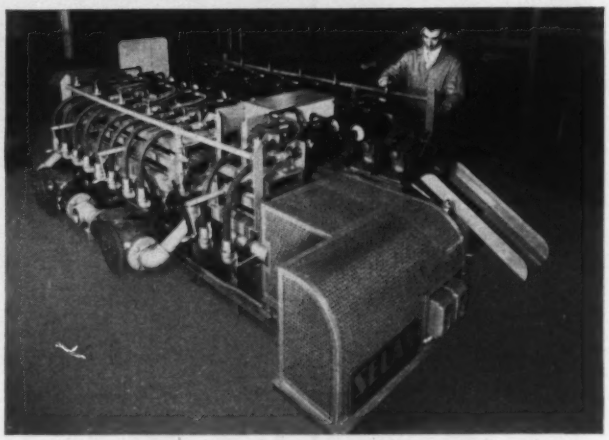
STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

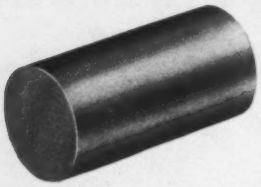
STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

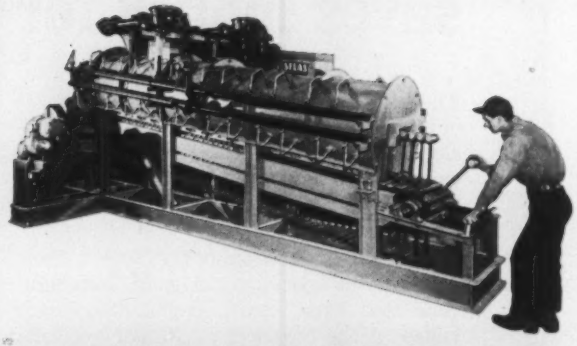
NEW SLANTS ON HEAT PROCESSING FROM SELAS

here's how industry cuts costs product quality with Selas

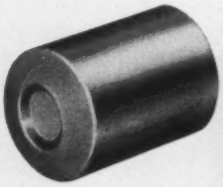


SELECTIVE HARDENING: *Both faces of sledge-hammer-heads are selectively hardened and tempered in a continuous operation. Tempering, previously requiring hours, now performed in minutes. Machine handles wide variety of sizes and shapes of heads. Integration with preceding grinding step enables operation of machine with no additional labor.*





HEATING FOR FORGING: *Brass slugs — ⅞ to 2" diam., 2½ to 8" long — are heated to 1390°F in this automatic machine at high production rates. Selas fast, uniform heating produces fine grain size, improved physical properties.*



ANNEALING: *Electric motor stator and rotor laminations are annealed to develop required electrical characteristics. Laminations, 2½ to 10" O.D., stacked 6" high on spindle fixtures, are heated uniformly and quickly, then control-cooled, in continuous operation. Complete cycle takes only 35 min., increases production rates substantially over conventional methods.*

. . . improves Heat Processing Equipment

POST HEATING: *After aluminum rotors for electric motors are die-cast, they are post-heated to approximately 950°F in this continuous, automated machine, at the rate of 375 pieces per hour to improve electrical characteristics. This equipment, which occupies an area of only 7 square feet, provides a fast, convenient method for shrink-fitting rotors to shafts, and replaces both manual heating and a press fitting operation.*

The installations on these pages demonstrate how Selas automatic heat processing equipment

- cuts operating costs
- increases production rates
- minimizes in-process inventory
- reduces labor requirements
- saves valuable floor space
- improves product quality

Specifically designed and custom-built to meet your individual production requirements and job specifications, Selas heat processing equipment employs time-proven standardized engineering features for longtime operating dependability and minimum initial investment. Problems usually associated with divided responsibility are avoided since Selas starts-up and services every machine it designs and builds.

Selas automatic or semi-automatic heat processing equipment can help you produce better products at lower costs. At your convenience—without obligation to you—a Selas field engineer would welcome the opportunity to survey your requirements.

For this free, personal service, or for literature on any of the heating operations shown here, write Mr. W. B. Troupe, General Industry Division.

SELAS CORPORATION OF AMERICA
211 Dreshertown Road, Dresher, Pa.

EUROPEAN SUBSIDIARY: Selas Corporation of America, European Div., S.A., Pregny, Geneva, Switzerland. INTERNATIONAL AFFILIATES: FRANCE—Societe Exploitation de Produits Industriels, Paris; JAPAN—International Machine Co., Ltd., Tokyo.

SELAS

HEAT AND FLUID PROCESSING ENGINEERS

DEVELOPMENT
•
DESIGN
•
CONSTRUCTION

... HEAT-TREATING - 1965 ...
CAMBRIDGE METAL-MESH BELTS are the answer to the big problems you'll face in the competitive '60's—tighter operating costs, higher production and consistent quality.
Continuous movement of products through heat-treating operations, as well as quenching, washing and drying, speeds up production and cuts costly manual handling.
Heat, liquids or gases flow through the belt and around the product for fast, thorough processing... assuring uniformly high quality.
Superior belt design and manufacturing techniques mean longer belt life, fewer repairs, lower operating costs.
Belts can be made heatproof or acidproof—in any mesh, weave, metal or alloy—with any side or surface attachments.
Call your Cambridge Field Engineer now. He'll be glad to discuss any aspect of Cambridge Belts—from manufacture to installation and service. Look in the yellow pages under "Belting, Mechanical". Or, write for FREE 130-PAGE REFERENCE MANUAL.
CONVEYOR BELTS
The Cambridge Wire Cloth Co.
Department J • Cambridge 11, Md.
Manufacturers of Wire Cloth, Metal-Mesh Conveyor Belts, Wire Cloth Fabrications

At Amana Refrigeration, Inc.

STANOIL

IMPROVES PRODUCTION
REDUCES MAINTENANCE

Smooths operation of 600 ton hydraulic press

Situation: The 600 ton Verson Press at Amana is a vital operating component in the manufacture of home freezers and refrigerators. Its proper performance is necessary to the efficiency of Amana's entire manufacturing operation. That's why erratic press operation, caused by foaming of the hydraulic oil, was a serious problem.

What was done? In seeking the solution to this problem, Amana consulted their Standard Oil lubrication specialist who recommended STANOIL for this service. STANOIL Industrial Oil is a top quality, first-line industrial lubricating and hydraulic oil. It will provide excellent service in many different applications. And when tested by Amana, STANOIL proved perfect for use.

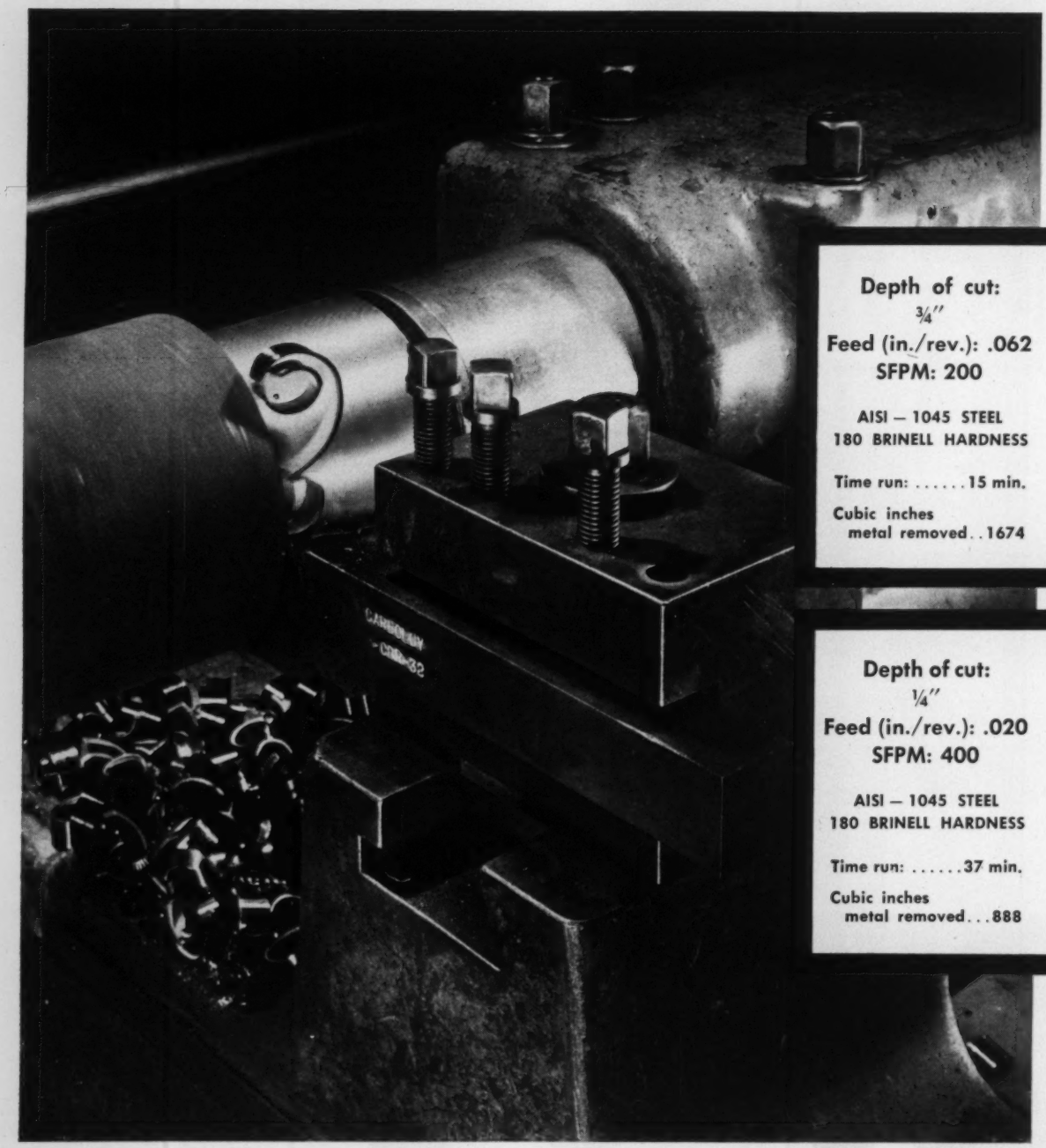
What has happened? Since STANOIL was first put to work at Amana, it has performed for extended periods of time without foaming or oxidation, lengthening the time between drainings and improving press operation. As a result of this record, STANOIL has been adopted for use on other production equipment, together with Standard's RYKON Greases and SUPERLA Soluble Oil.

What you can do: To get help in solving your lubrication problems and to learn more about STANOIL Industrial Oils, simply call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Ill.**

You expect more from STANDARD and you get it!

Standard's Jess Nelson (center) and Gene Maske (left) checking lubrication survey with Leonard Rettig, Amana's plant maintenance superintendent. Jess, who is District Engineer for Standard, is a specialist in this kind of operation. He has an engineering degree from the University of Iowa, and has also graduated from the Standard Oil Sales Engineering School

Why ?



Depth of cut:
¾″
Feed (in./rev.): .062
SFPM: 200

AISI – 1045 STEEL
180 BRINELL HARDNESS

Time run: . . . . . 15 min.

Cubic inches metal removed . . 1674

Depth of cut:
¼″
Feed (in./rev.): .020
SFPM: 400

AISI – 1045 STEEL
180 BRINELL HARDNESS

Time run: . . . . . 37 min.

Cubic inches metal removed . . . 888

Why is one Carboloy® carbide grade best for light-duty steel-cutting applications; another more suitable for heavy-duty jobs? And which should you use?

Carbide selection can be scientific (and *should* be!) if you are going to get optimum results from your steel-cutting operation.

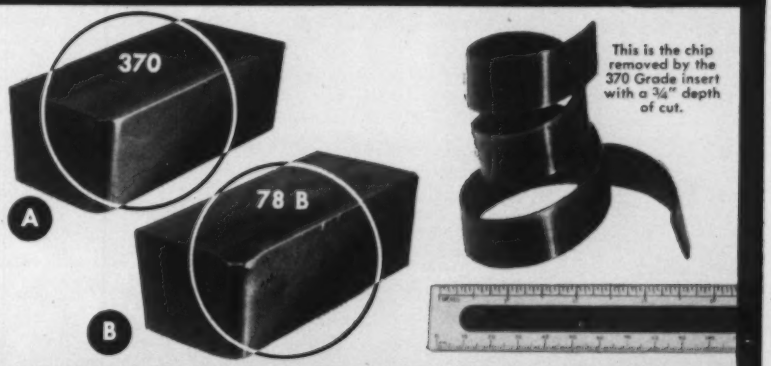
Take the job-graded Carboloy Grades 78B* and 370, for example. The 78B Grade is designed to offer real economy in normal steel-cutting applications—where machine power is limited. The 370 Grade, on the other hand, was developed specifically for heavy-duty steel-cutting jobs. Look over the following examples; then contact your Carboloy representative, or Authorized Carboloy Distributor, for information on Carboloy *job-graded* carbides for your specific operation. Take advantage of *better profits through better tooling.* Call today, or write: *Metallurgical Products Department of General Electric Company, 11141 E. 8 Mile Road, Detroit 32, Michigan.*

*Carbides in 78 Series are all pre-honed. Carbides in the 300 series are available pre-honed, precision-ground, or utility-ground.

HEAVY-DUTY MACHINING

Photograph A shows the Carboloy 370 Grade insert after the run. Wear land was only .012", and there is no deformation (upsetting) of the cutting edge. Photo B shows the 78B Grade insert after the same run. Note the deformation of the cutting edge . . . Grade 78B was not designed for such severe cutting pressures.

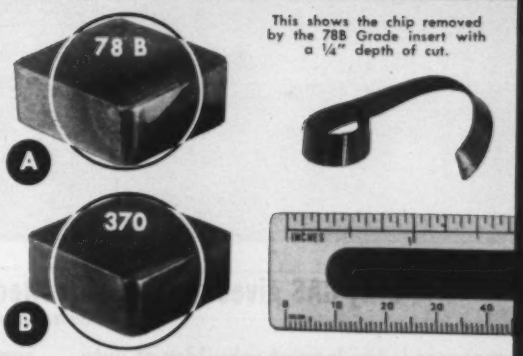
CONCLUSION: *In this heavy-duty application, Carboloy 370 Grade is recommended.*



LIGHT-DUTY MACHINING

In this light-roughing application there is little visible difference between the Carboloy 78B Grade insert (Photo A) and the 370 Grade insert (Photo B). Because 78B Grade is job-graded for light- and medium-roughing applications, it will wear as long as 370 Grade. Grade 78B insert is lower in initial cost, so in this case it makes good sense to use Grade 78B. In this example, the wear land on 78B insert was only .010".

CONCLUSION: *In this normal steel-cutting application, Carboloy 78B Grade is recommended.*



CARBOLOY® CEMENTED CARBIDES

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

"Only GAS gives quick, controlled, complete combustion"

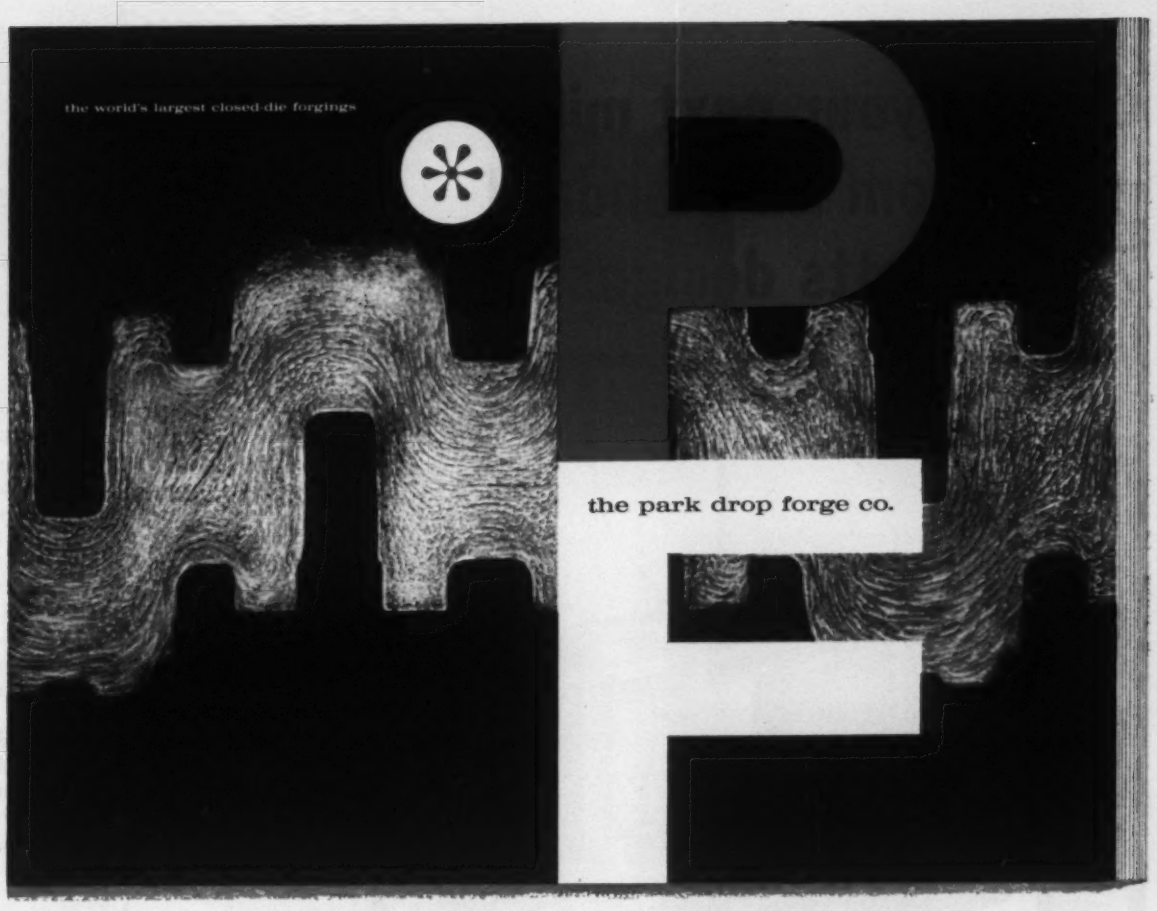
Albert Holzwasser, President, Arrow Armatures, Boston

"Arrow Armatures is the largest rebuilder of automobile generators in the East. One of the important steps in rebuilding generators is burning the old insulation from the armature before it is rewound. Because gas gives quick heat that can be accurately controlled, it answers our need perfectly.

"We also have a gas-fired catalytic combustion unit to incinerate the smoke and fumes produced in burning off this insulation. Together these units give us complete, clean combustion with no smoke control problems," states Albert Holzwasser, President.

Quick, controlled, complete combustion—and the many other advantages of gas—can be yours, too. For technical information, see your Gas Company's Industrial Sales Engineer. He can show you the economies and results you'll get with modern industrial gas equipment. *American Gas Association.*

FOR PRECISE CONTROL, GAS IS GOOD BUSINESS!



Use these Pertinent Facts about Park Forgings to your advantage

This brochure was designed to show you how much more you can get from Park's facilities and techniques in producing a wide range of closed-die forgings.

Your copy will be mailed to you immediately on receipt of the filled out coupon, or a letter from you.

the park drop forge co.

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Company_____

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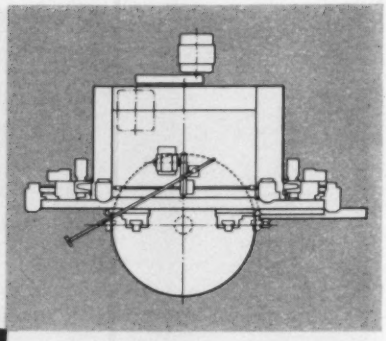
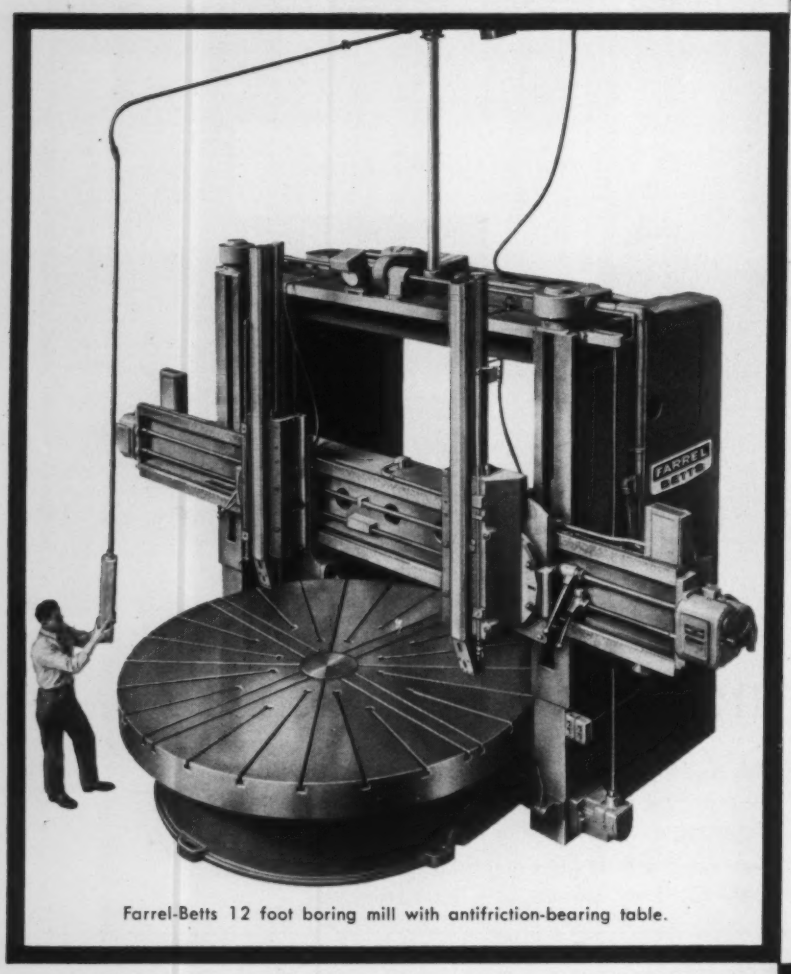
Choose your next mill from 22 standard Farrel-Betts designs





Farrel-Betts 12 foot boring mill with antifriction-bearing table.

Built in four size groups, Farrel-Betts mills are available in swing capacities from 7 to 30 feet. In this wide range you will find not only standard designs but many optional features which will give you added flexibility in choosing the right mill for the right job. If a standard design will not meet your needs, Consolidated has engineered mills with swings up to 42′ and larger to suit the most exacting requirements.

All Farrel-Betts mills are backed by over 50 years of experience and customer acceptance. As the result of a continuing program of research and the development of new methods in electronics, tooling and lubrication, Farrel-Betts mills represent the most modern designs available.

Write today for the bulletin listed below. It will guide you in the selection of your next mill and provide you with invaluable technical information.

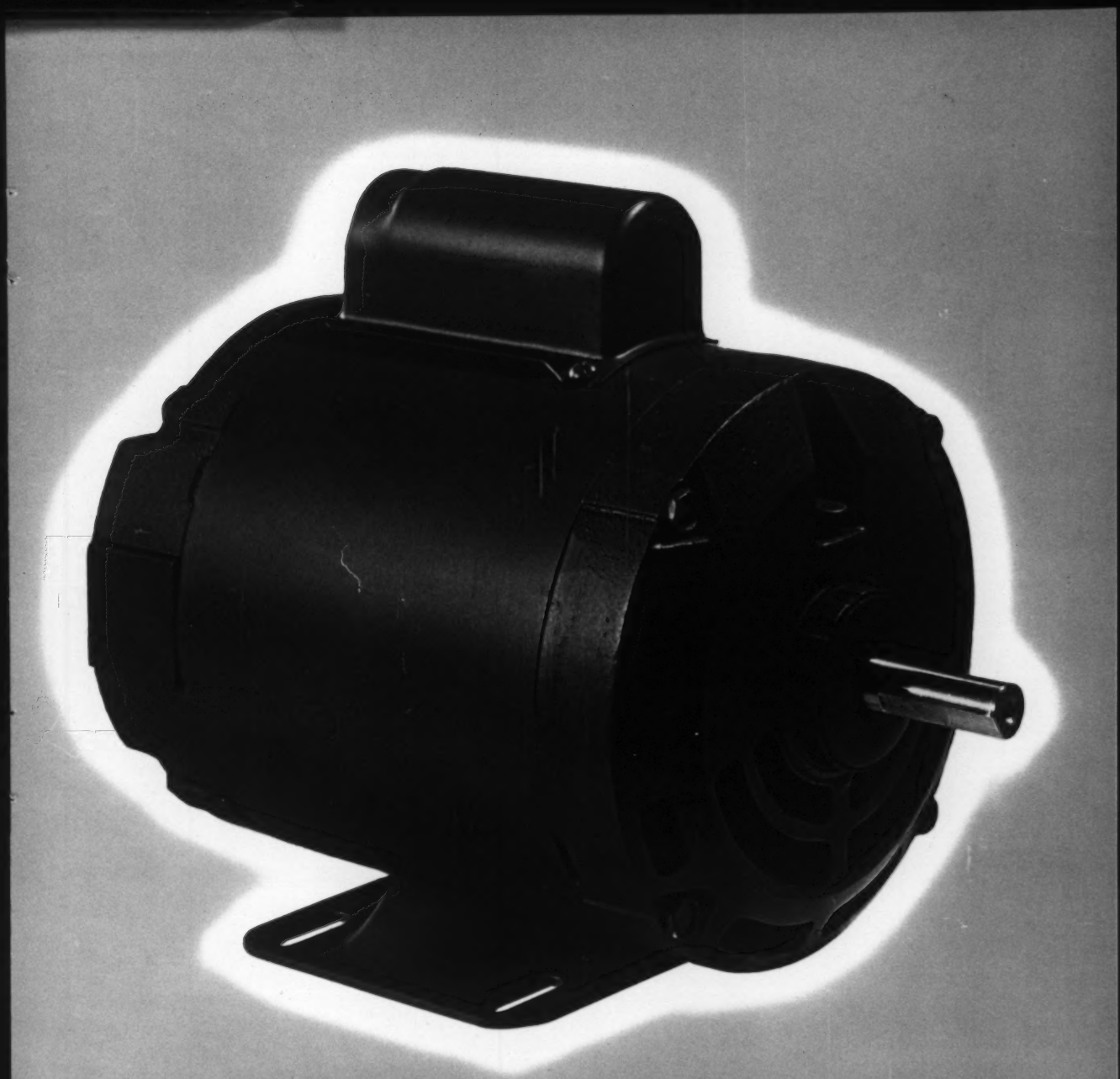
FARREL-BIRMINGHAM COMPANY, INC.
CONSOLIDATED MACHINE TOOL DIVISION
565 Blossom Road, Rochester 10, N. Y.
Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

FARREL
BETTS

NEW 42-PAGE BULLETIN — Includes complete specifications, sizes, and design features of four different groups of boring mills. Ask for bulletin 1220.

CONSOLIDATED ALSO BUILDS Engine Lathes • Roll Lathes • Vertical Boring and Turning Mills • Floor and Planer-type Horizontals • Planers, Double Housing and Openside • Planer-type Milling Machines • Plate-edge Planers and Millers • Vertical Slotters • Rotary and Straightline Production-type Milling Machines • Skin Mills and Cavity Mills for Aircraft Manufacturing • Circular Cold Saws • Railroad Wheel and Axle Machinery • Drill Grinders • Special Machine Tools

CM-60



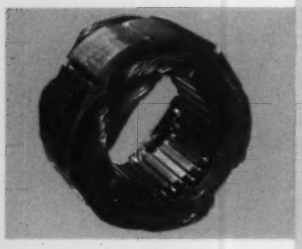
A NEW Duty Master FHP.

for heavy-duty industrial use

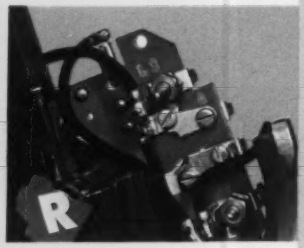
RELIANCE ELECTRIC AND ENGINEERING COMPANY

MASTER ELECTRIC COMPANY DIVISION

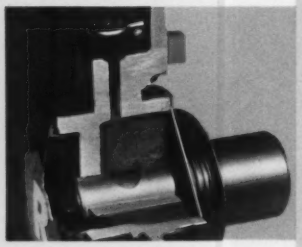
A NEW Duty Master FHP.



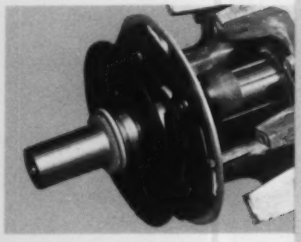
PROTECTED STATOR



TERMINAL BOARD



SLEEVE BEARING



CENTRIFUGAL CUT-OUT

TOUGH... COMPACT... COOL!

A motor that combines new, most-wanted features at no extra cost

Duty Master:

This motor is tough all over . . . deliberately designed for heavy industrial duty. Frame is rolled from steel—end shields cast from an aluminum alloy specifically selected for strength. Ball bearings are double-shielded, with lubricant packed into the bearing for life. Sleeve bearings are steel-backed and babbitt-lined for low friction and long wear. "Permawick" oil retaining material provides maximum lubrication to these bearings. Rotor is pressure-cast from high purity, low-resistance aluminum. Varnish impregnated stator resists moisture . . . and adds strength to windings.

Duty Master:

More power per pound . . . simple installation, 33% lighter than other preceding motor designs. Good design and materials make the difference. Makers of motor-driven products save on shipping and handling costs. Duty Master's light weight and small size make possible lighter, less complex mounting on equipment. Terminal board provides easy power connection in the front end shield. Cover plate quickly removable. Motor rotation easily reversed by interchanging slip-on connections.

Duty Master:

Up to 10% cooler than other comparably rated motors . . . yet gives you maximum protection. High load capacity results from new, effective ventilation of critical heat sources. Laminations, coils and rotor are literally rinsed with cooling air through new end shield design. In totally-enclosed, non-ventilated motors, the fan, cast integrally with rotor, circulates the air within the motor at a rate appropriate to efficient transfer of heat to motor frame and end shield. And load carrying capacity of the totally-enclosed fan-cooled motor is increased by a fan and shroud directing air over the frame and end shield.

Duty Master:

Quiet . . . Smooth . . . Positive. Resilient mounting composed of metal-rimmed, rubber-cushioning rings that encircle the bearing hubs on each end and support the motor. Motor can be mounted in any position. Single phase starter winding circuit automatically opens at 80% of full load speed. Action is quiet and positive.

Available now in 48 and 56 frame sizes, from conveniently located stocks. Duty Master FHP. is made in ⅛, ⅙, ¼, ⅓, ½ and ¾ hp. capacitor-start, split-phase and polyphase for 48 and 56 frames; repulsion-start induction-run in 56 frame. Your Reliance Sales Engineer or Distributor has all the facts at his finger tips. Call him or write for Bulletin B-2514. It will be sent to you promptly. B-1075

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Product of the combined resources of Reliance Electric and Engineering Company and its Master and Reeves Divisions

RELIANCE ELECTRIC AND ENGINEERING CO.

CLEVELAND 17, OHIO
Canadian Division: Toronto, Ontario
Sales Offices and Distributors in principal cities

Duty Master A-c. Motors, Master Gearmotors, Reeves Drives, V★S Drives, Super 'T' D-c. Motors, Generators, Controls and Engineered Drive Systems.

Steels and irons with "vitality" to spare...*start with Vancoram Ferrovanadium*

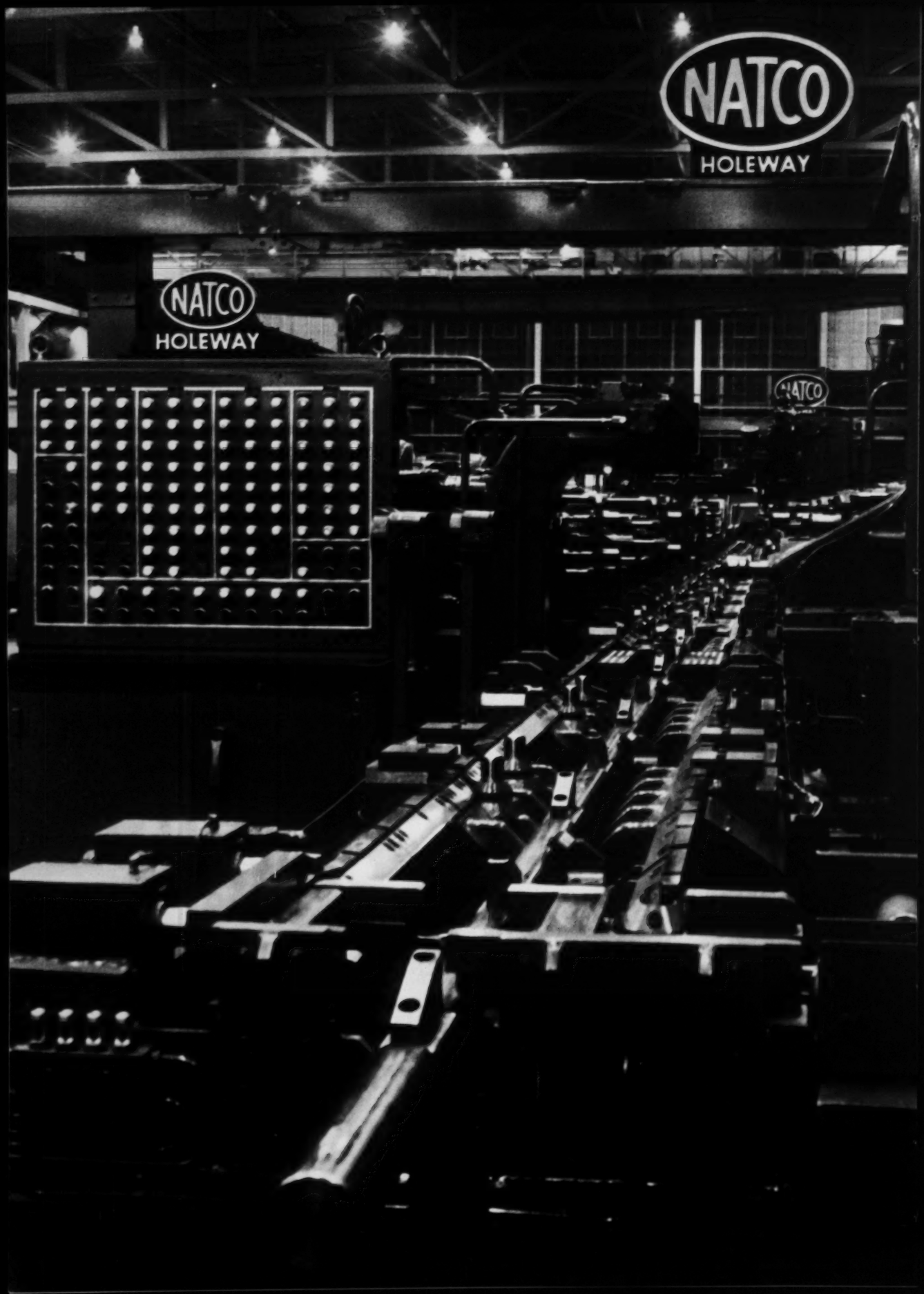
It takes only a small amount of Vancoram Ferrovanadium to impart *extra* strength and *extra* durability to a wide variety of steels and irons. Ferrovanadium controls grain size, improves hardenability, and is especially useful in tool and die steels because it provides excellent cutting and wearing characteristics. Constructional steels, deep-drawing steels, and cast and forged steels also benefit from Vancoram Ferrovanadium additions.

In cast irons, Ferrovanadium promotes formation of small, uniform graphite flakes, thus increasing tensile strength. Furthermore, the presence of vanadium carbide improves resistance to structural changes at elevated temperatures. Write for literature, or call your nearest VCA District Office. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh.

Vancoram Products are also distributed by: Pacific Metals Co., Ltd. • Steel Sales Corporation • J. M. Tull Metal and Supply Co., Inc. • Whitehead Metals, Inc. • Williams and Company, Inc.

VANADIUM
CORPORATION OF AMERICA
Producers of alloys, metals and chemicals

VANCORAM


NATCO
HOLEWAY
NATCO
HOLEWAY
NATCO

Machining sequence is straight line, controlled from a single station, with pallet return conveyor.

Compact Machining for Compact Cars

Quality, quantity, and convenience in minimum space mark this Natco Holeway, built for machining steering knuckles for one of tomorrow's compact cars. It's a pallet-type machine, and once right and left hand knuckles are clamped in the pallet, there's no rehandling through 48 separate machining operations (plus many probing, cleaning, and orienting operations).

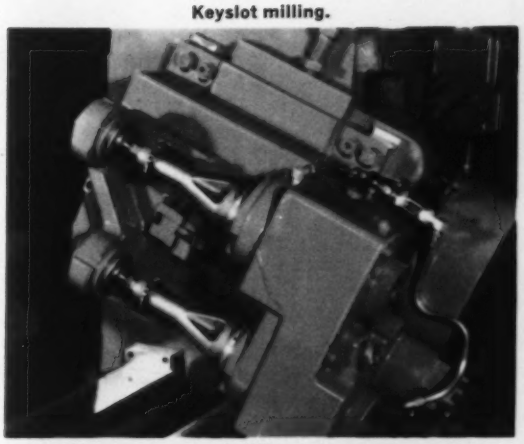
Building block construction accommodates 18 separate stations in one tight package, and will save tremendously in lead time and rebuilding costs when it comes time for model changeover. The machining operations include drilling, tapping, deburring, taper reaming, face milling, chamfering, straight reaming, threading, and keyway milling. Production rate? 100 parts an hour.

Whether you manufacture parts for compact cars or trucks, Natco has a way to machine them better. Call your Natco representative for facts.

NATCO

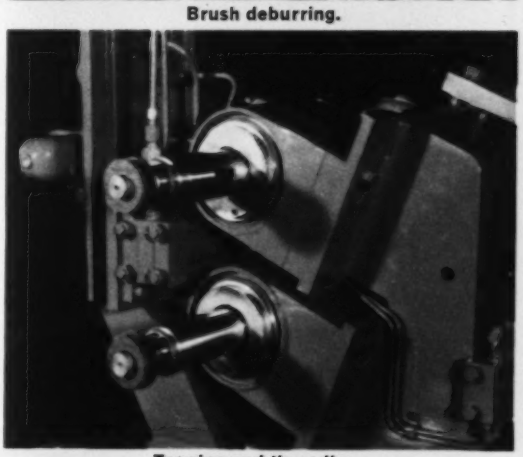
The National Automatic Tool Company, Inc., Richmond, Indiana

Keyslot milling.

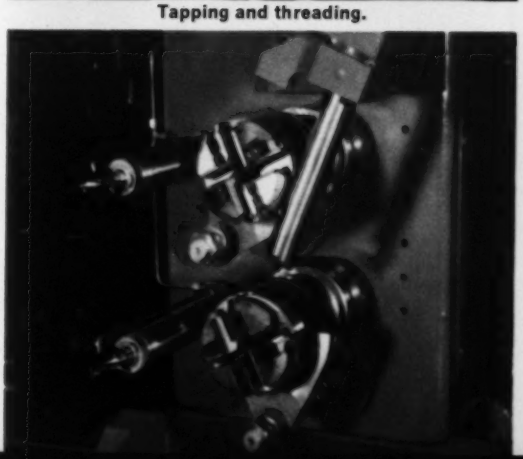


Drilling.

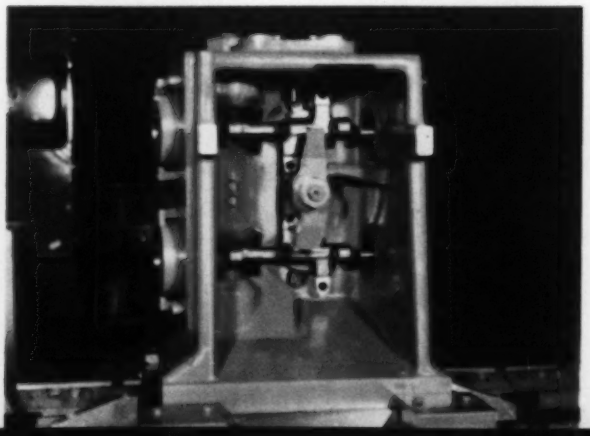
Brush deburring.



Tapping and threading.



Pallet holds right and left-hand steering knuckles.



ALLIS-CHALMERS LIFT TRUCKS keep *Moving* and *Paying* at Vendo

REG. U.S. PAT. OFF.

Vendo is one of the world's largest producers of vending machines. Obviously, many of its products are pressed into service without ever leaving the plant. The Allis-Chalmers lift truck is one of 14 in use at this plant.

Operator John Cromer reports, "I like the way an Allis-Chalmers lift truck performs. I like the transmission. I like the way it handles. I just like the whole machine!"

Four years ago, The Vendo Company put an Allis-Chalmers lift truck to work in its Kansas City, Missouri, plant — and discovered there *is* a dollar-saving difference in lift trucks. As Clyde Hickman, material handling foreman, said then, "A lift truck has to keep moving or you lose money, and ours keep moving."

Clyde Hickman, material handling foreman, says, "these A-C trucks keep moving."

When reminded of this statement recently, Hickman answered, "What I said then still goes — only more so. We now own 12 Allis-Chalmers trucks and operate two others on a rental basis. That original truck has close to 13,000 hours and hasn't needed an engine overhaul — neither has any of the others."

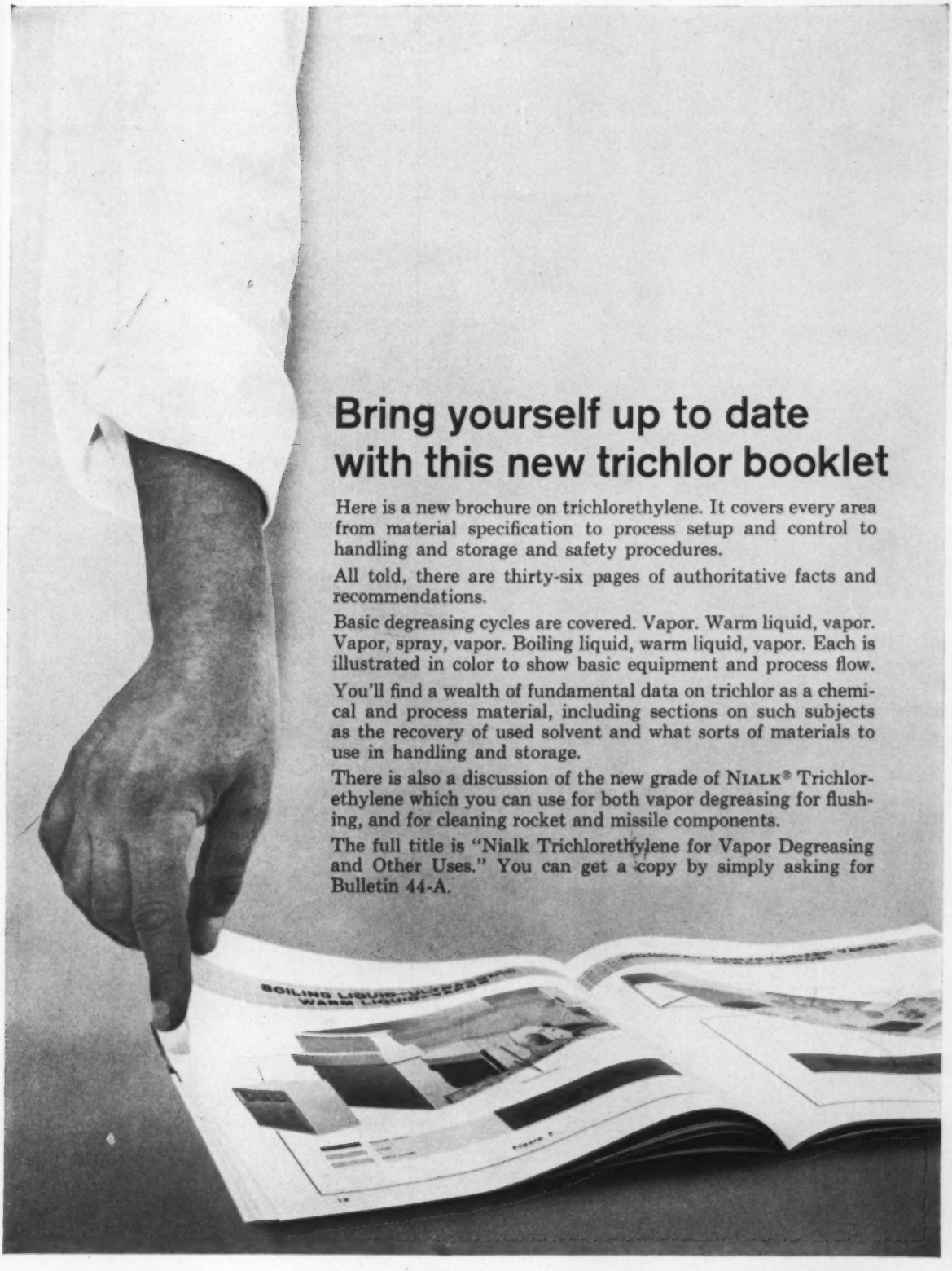
The man responsible for keeping this fleet on the move is Clyde Dent, mechanic. He takes this responsibility seriously. When a truck is pulled in off the job, it gets real "pit stop" service. Here Allis-Chalmers' easy accessibility really pays off. As Clyde described it, "When a lift truck comes in for minor service, we usually get it back on the job before the exhaust pipe cools off, and I've got burns on my arm to prove it!"

Clyde Dent, mechanic, says, "maintenance expenses are low."

Let your Allis-Chalmers dealer show you how these tough trucks will keep going, and paying, on *your* job. Ask for a demonstration. Allis-Chalmers, Milwaukee 1, Wisconsin.

BH-149

ALLIS-CHALMERS power for a growing world



Bring yourself up to date with this new trichlor booklet

Here is a new brochure on trichlorethylene. It covers every area from material specification to process setup and control to handling and storage and safety procedures.

All told, there are thirty-six pages of authoritative facts and recommendations.

Basic degreasing cycles are covered. Vapor. Warm liquid, vapor. Vapor, spray, vapor. Boiling liquid, warm liquid, vapor. Each is illustrated in color to show basic equipment and process flow.

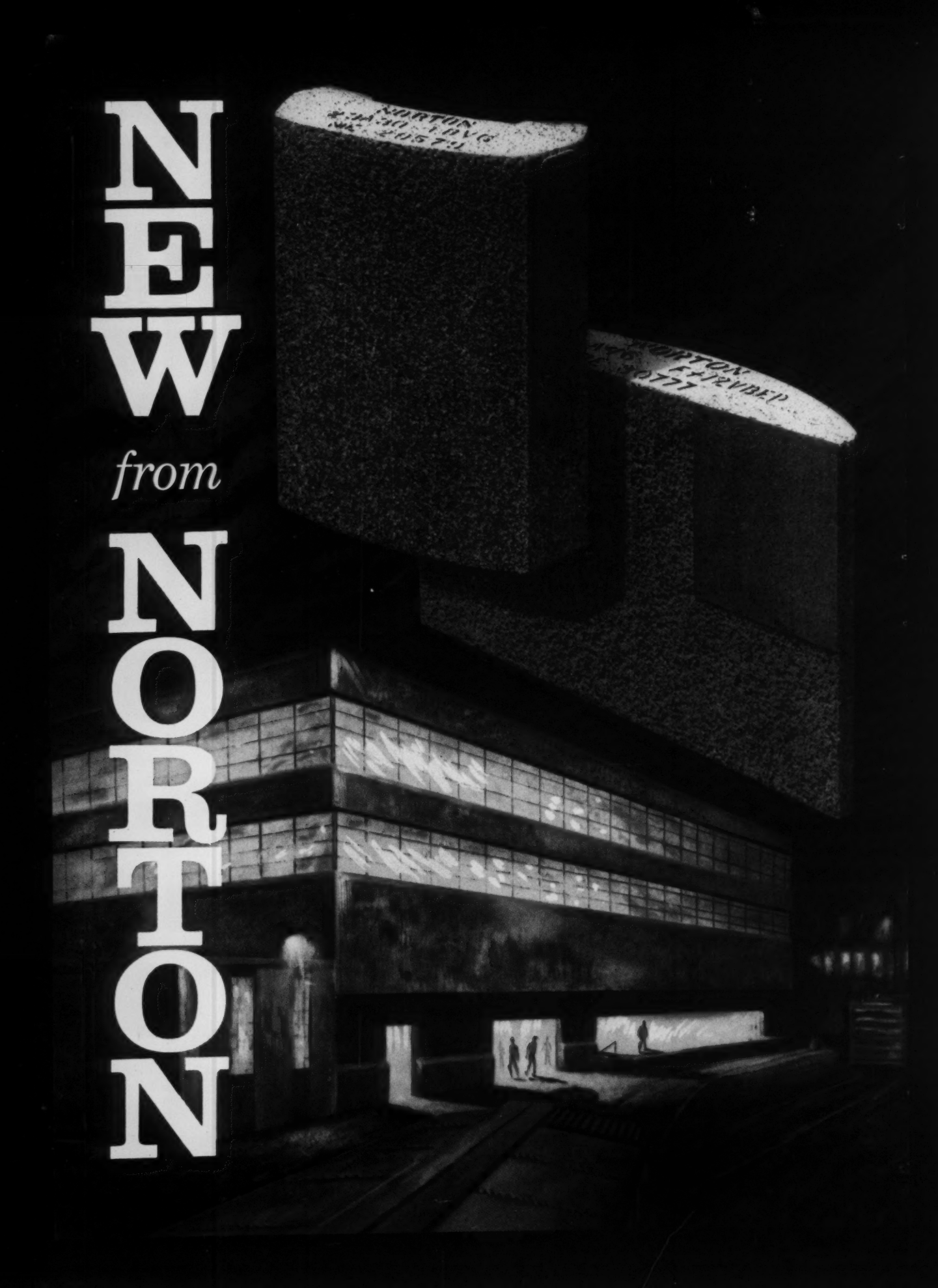
You'll find a wealth of fundamental data on trichlor as a chemical and process material, including sections on such subjects as the recovery of used solvent and what sorts of materials to use in handling and storage.

There is also a discussion of the new grade of NIALK® Trichlorethylene which you can use for both vapor degreasing for flushing, and for cleaning rocket and missile components.

The full title is "Nialk Trichlorethylene for Vapor Degreasing and Other Uses." You can get a copy by simply asking for Bulletin 44-A.

HOOKER CHEMICAL CORPORATION
1211 Union Street, Niagara Falls, New York
Sales Offices: Buffalo Chicago Detroit Los Angeles New York Niagara Falls Philadelphia Tacoma Worcester, Massachusetts
In Canada: Hooker Chemicals Limited, North Vancouver, British Columbia

HOOKER CHEMICALS PLASTICS


NEW
from
NORTON

Segments of new 23 ALUNDUM abrasive . . .*

premium performance at non-premium price

Surface grinding gets a real performance-lift from Norton — combined with a definite economy!

Newest development for segments for vertical spindle surface grinders is 23 ALUNDUM abrasive.

This is no ordinary aluminum oxide. Here you get premium toughness and sharpness — plus the friable nature that eliminates dressing.

Two other big advantages are versatility and uniformity. 23 ALUNDUM abrasive is ideal for surface grinding carbon steels, mild steels, stainless steels, Meehanite and aluminum. And to this broad range 23 ALUNDUM segments bring maximum uniformity of performance — the results of a two-year Norton project to develop the closest possible duplication of structure and dimensions.

Users already know these benefits

Segments of 23 ALUNDUM abrasive have had thorough test runs from coast to coast. The following reports from Norton surface grinding customers are typical:

- *"With the new segments we get freer cutting and higher production rate."*
- *"Very good on all our metals. Required no dressing."*
- *"No burn, even with full power. Better finish, longer life on all metals. We're standardizing on '23'."*
- *"Best segments we've ever used for general purposes, including chrome plate."*
- *"Much less dressing, faster cut, less heat."*

Find out how 23 ALUNDUM segments can benefit your own production. See your Norton Distributor about a test run in your plant. Or your Norton Man will give you plenty of facts about this big, new advancement in surface grinding. NORTON COMPANY, General offices, Worcester 6, Massachusetts. Plants and distributors around the world.

W-2001

NORTON
ABRASIVES

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

New steels are born at Armco

from bins to bikes . . .

Sheffield has the right bolts

Sheffield bolts do a better fastening job in thousands of products and applications, ranging from huge grain bins to backyard bike repairs.

Why? Because every Sheffield bolt is a precision product, made to fine tolerances and quality controlled from furnace to finished bolt. Sheffield's bolt plant is one of the world's largest. It's staffed by a team of metallurgists, engineers and research experts who specialize in bolts.

These are some of the reasons why you'll get the right bolts from Sheffield, and get them right on time. Whether your needs are for standard bolts, special bolts or bolt products made to your specifications, get in touch with your Sheffield Man.

SHEFFIELD
ARMCO

BOLT PRODUCTS

SHEFFIELD DIVISION

Sheffield Plants in Kansas City, Tulsa and Houston

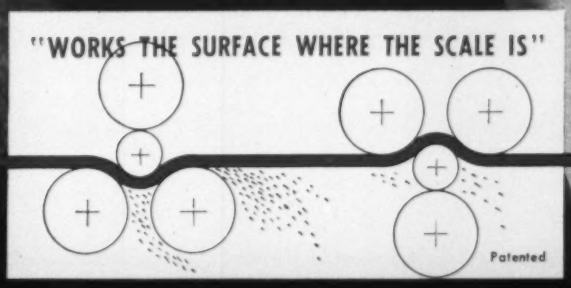
ARMCO

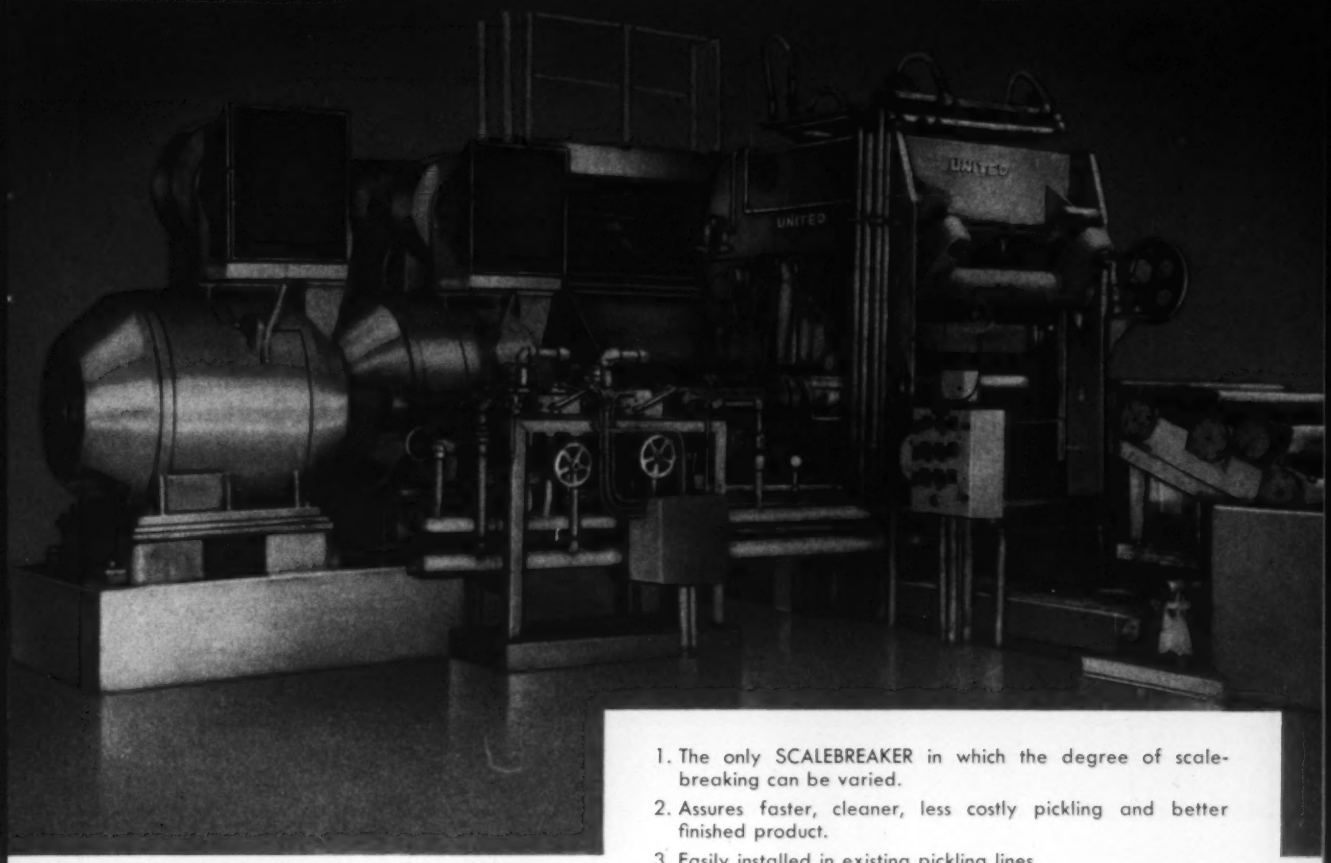
ARMCO STEEL CORPORATION

OTHER DIVISIONS AND SUBSIDIARIES: Armco Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

UNITED®

NEW *Strip Processing* SCALEBREAKER





1. The only SCALEBREAKER in which the degree of scale-breaking can be varied.
2. Assures faster, cleaner, less costly pickling and better finished product.
3. Easily installed in existing pickling lines.

Write today for complete engineering data.

UNITED ENGINEERING AND FOUNDRY COMPANY

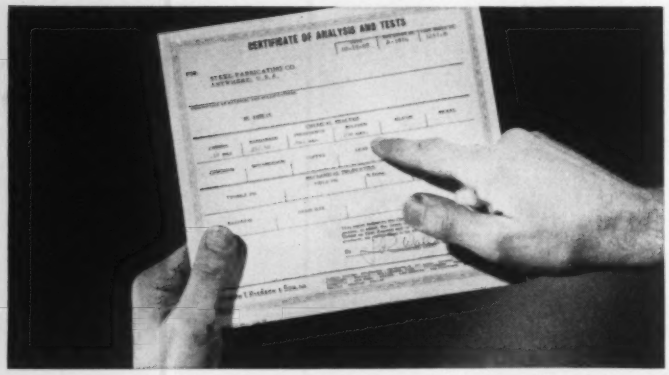
PITTSBURGH, PENNSYLVANIA

Plants at: Pittsburgh • Vandergrift • Youngstown • Canton • Wilmington

Subsidiaries: Adamson United Company, Akron, Ohio
Stedman Foundry and Machine Company, Inc., Aurora, Indiana

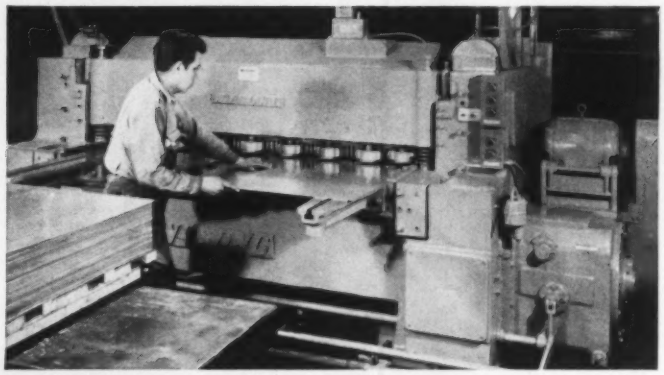
Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

How Ryerson gives you EXTRA VALUE IN SHEET STEEL



Carbon control—Did you know that Ryerson can furnish a conformance report, if requested when your order is placed, certifying that hot or cold rolled low carbon sheets in stock sizes are SAE 1008 with maximum carbon content of .10? This means you can minimize or eliminate problems of variation in formability and weldability.

Closest cutting tolerances—Our standard "aim" tolerances are the closest in the industry. For example, on shearing of sheets: width or length tolerance—under 48″, -1/32″; 48″ and over, -1/16″. These limits can be guaranteed upon specific request, given in advance of processing your order.



Fast, dependable service—Hundreds of customers often cite these two major reasons for ordering from Ryerson: absolute confidence in "dependability of service as promised," and speed of service to meet their most critical requirements.

Whatever your sheet and strip requirements, a Ryerson specialist is ready to consult with you. A phone call is all it takes.

METALOGICS
RYERSON PLUS VALUES

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

RYERSON STEEL

Joseph T. Ryerson & Son, Inc., Member of the INLAND Steel Family

PLANT SERVICE CENTERS: BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON • INDIANAPOLIS
LOS ANGELES • MILWAUKEE • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • SPOKANE • WALLINGFORD

Gainsbrugh Sees Good Year; Predicts Upturn

Martin R. Gainsbrugh, chief economist, National Industrial Conference Board, says the nation's output of goods and services in 1960 will reach a record. He predicts that gross national product will exceed $500 billion—up about $20 billion, or 4 per cent, from the 1959 level. Adjusted for inflation, the 1960 rate of increase will be about 2.8 per cent. Mr. Gainsbrugh notes "an improved tone of confidence" among consumers. He says a survey of consumer buying plans just completed by NICB foreshadows increases in new car sales and suggests the possibility of an upturn in furniture and appliances.

The Trouble with Budgets

Too many companies are failing to use budgets properly as a cost reduction tool, Carl W. Nedderman, vice president, Edward Valves Inc., told an Industrial Management Society seminar in Chicago. He points out: 1. The relationship between budgets and responsibility must be stated more clearly. 2. Too often, variance analysis does not initiate or direct corrective action. 3. Averaging tends to obscure the peaks and valleys that are significant in finding areas for cost reduction. 4. Budgeting tends to become a method or procedure sacred unto itself rather than being a means for improving performance. 5. Business expense is increasing; management tends to become institutional—run by itself for itself.

Kennedy Studies Ways to Counter Unemployment

President-elect Kennedy is studying a series of moves to counter the threat of increased unemployment. Steps under consideration reportedly center on faster federal spending, home building stimulants, and more, cheaper loans to small businesses. Unemployment rose 191,000 in October, the largest September to October increase since the end of World War II.

Two Steelmakers to Build

U. S. Steel Corp. will construct a third, galvanized sheet production line at its Gary (Ind.) sheet and tin mill. It's scheduled for operation about mid-1962 . . . Armco Steel Corp. will spend $2.5 million to consolidate its spiral welded pipe manufacturing operations in a fully integrated plant in Middletown, Ohio. Construction will begin early in '61.

Ohio May Get Aluminum Mill

A $30 million aluminum mill to be built jointly by Aluminium Ltd., Bridgeport Brass Co., Cerro de Pasco Corp., and Scovill Mfg. Co. may be located in Ohio. While a site has not been chosen, STEEL learned that one of the

proposals is being made for the Ashtabula, Ohio, area, which would be convenient to sheet mills of most participants. The new, hot rolling, mill reportedly will have an annual output of 100,000 tons of reroll stock. STEEL has learned that Aluminium will own 50 per cent of the facility, and the other mills will split the remainder evenly.

Soaring Sales Taxes Hit $4.3 Billion

Sales tax collection by the states reached $4.3 billion during fiscal 1960—16 per cent higher than in any previous year. Commerce Clearing House, Chicago, says it was the major source of revenue in 30 states and accounted for nearly one-fourth of total state tax collections. State income taxes, up 23 per cent in fiscal '60 to $3.4 billion, were the second largest revenue source. Gasoline tax collections, up 10 per cent, totaled $3.3 billion.

'Buy American' Modification Coming?

Washington observers expect a directive from the White House shortly giving a new interpretation of the "national interest" section of the 1954 executive order of the Buy American Act. The Bureau of Reclamation is reportedly sitting on bids from General Electric Co. and Hitachi of Japan for heavy electrical equipment. Hitachi is low, but Reclamation doesn't want to award the contract until it gets White House interpretation of the "national interest" clause. Last week, the President issued a directive ordering government agencies to reduce overseas procurement where possible (see Page 76).

Brown & Sharpe Offers Trade-in-Deal

Brown & Sharpe Mfg. Co., Providence, R. I., is offering an allowance of $500 for each old, B&S, automatic screw machine (regardless of age or condition) traded in on a new, B&S, automatic screw machine. (The offer applies only in the U. S.) "We believe the trade-in allowance will be the added stimulus needed to induce many owners to modernize the automatic screw machine sections of their plants," says Wallace B. Bainton, vice president and general manager, Machine Tool Div.

Industry Is Heading Back into Cities

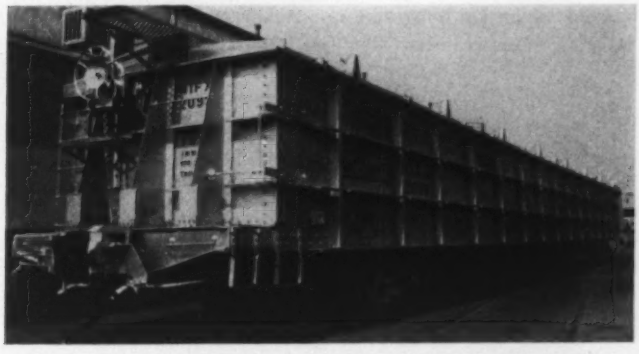
The flight of industry to rural communities has been reversed, claims C. A. Nutter, president, National Association of Real Estate Boards. He says the industrial growth of the 1960s will be concentrated in urban areas. He says, "A significant number of industrialists who took to the hills in the last ten years are having sober second thoughts."

Our Striking Brothers' Keepers

United Auto Workers Local 1005 in Cleveland distributed handbills door to door last week, urging residents to donate money for members of UAW's Local

346 who are on strike against Van Dorn Iron Works. The message: "We are our brothers' keepers . . . dig deep and give these strikers an enjoyable holiday." Van Dorn (which has offered a 7-cent-an-hour wage hike) is asking the strikers to return to their jobs. The UAW interprets the back-to-work attempt as a union busting tactic, and says: "We believe this procedure will spread throughout the labor movement if we do not unite and put a stop to it."

85 ft, Aluminum Rail Car Built



This 85 ft, aluminum railroad car has just been tested in a coast-to-coast run. Developed by Harvey Aluminum, Torrance, Calif., in co-operation with Rock Island Lines and North American Car Corp., the car is said to offer an 8-ton payload increase over comparable steel equipment.

Japan Predicts Big Gains in Electronics Output

The Japanese Ministry of International Trade & Industry has hiked its estimates of increases in electronics output between 1960 and 1964. Here are nine percentage increases, one decrease (in units) for selected products:

Radios	3%	Digital computers	760%
Tape recorders	146%	Analog computers	48%
TV receivers	−5%	General purpose computers	19,900%
Color TV sets	2,400%	Receiving tubes	33%
Direction detectors	89%	Transistors	147%

Chrysler to Make Last De Soto This Week

Chrysler Corp. is expected to run the last De Soto off its assembly line this week. The demise of the De Soto had been rumored (and officially denied) for a long time. Only 19,000 of the cars have been built this year; about 42,000 were sold last year. Unconfirmed reports are flying that Chrysler will introduce a sports-type car (competitive with the Thunderbird) in 1962 and call it De Soto.

How Russia Competes in Europe

"The Russians will take any amount the trade will pay" in their efforts to crack European markets, asserts Howard S. Bunn, vice chairman, Union Carbide Corp. He cites electrodes for steel furnaces being sold at lower prices by the Russians in Italy than Union Carbide's Italian subsidiary could sell them. He says the Russians turn over all receipts from the sale of their prod-

ucts in Italy to the Italian Communist Party—it's their way of financing Communist activity in Italy.

Aluminum Consumption to Soar

The Free World will be consuming aluminum at the rate of 5.5 million tons yearly by 1965, predicts Nathanael V. Davis, president, Aluminium Ltd. Consumption last year was 3.4 million tons. Capacity by 1965 will at least equal the consumption forecast "or could even surpass 7 million tons if other contemplated expansion programs are embarked upon too quickly with too little regard for reality," says Mr. Davis.

ICC Aides Urge Help for Railroads

Commissioner Charles A. Webb and R. S. Ries, hearing examiner, have urged the Interstate Commerce Commission to ask Congress for authority to declare taxes levied by state and local authorities on interstate railroads unlawful. The aides also suggest that the ICC ask Congress for a federal program to enable railroads to acquire passenger train equipment on terms more liberal than those now available. The report also repeated the ICC's earlier recommendation for repeal of the 10 per cent federal excise tax on passenger fares.

Straws in the Wind

Expect new plant and equipment expenditures to decline about 10 per cent next year, says A. G. Abramson, director-economic planning, SKF Industries Inc. . . . Personal income rose $800 million in October to a record, seasonally adjusted annual rate of $409.6 billion . . . Business failures rose 6 per cent in October, reports Dun & Bradstreet Inc. . . . W. J. Grede, president, J. I. Case Co., reports that 1000 dealers have qualified to attend the firm's Hawaii world premiere by meeting increased retail sales quotas . . . Hughes Aircraft Co. has announced price reductions on silicon transistors of $9 to $19 per unit . . . The Tacoma (Wash.) Utility Board has set a policy to accept no major foreign equipment . . . The average deferred wage increase to become effective in manufacturing next year is 7.3 cents an hour, reports the Bureau of National Affairs Inc., Washington.

Metalworking Pulse

The Business Trend: Renewed strength in auto production and a seasonal upturn in output of electric power pushed STEEL's index up 2 points. **Autos:** The auto industry is expected to shut down for a minimum of one day for Thanksgiving. Scattered plants will take longer, cutting production by about 40,000 units from the previous week. **Steel:** Output dropped to the lowest point since July 4. Reasons: Upcoming holiday, slack business.

- **INDUSTRIAL PRODUCTION**
  Week ended Nov. 19 . . . . 152†
  Year ago 158
  Details on Page 91
- **PASSENGER CAR PRODUCTION**
  Week ended Nov. 26 . 110,000*
  Year ago 46,740
  Details on Page 88
- **INGOT PRODUCTION RATE**
  Week ended Nov. 27 . 47.5%†
  Week ago 51.6%
  Details on Page 150

†Preliminary. *Estimated.

Copyright 1960 by STEEL, Penton Building, Cleveland 13, Ohio

3 OR 30,000 PIECES

Cut them off MORE ACCURATELY at LOWER COST and FASTER on a MARVEL Hack Saw

1. Accuracy? 2. Speed? 3. Low Cost?

Which is most important in your production or intermittent cutting-off operations? *You get all 3* when your work is handled on a MARVEL Series 6A or 9A Heavy Duty Ball Bearing Hack Saw. Whether you're cutting 3 or 30,000 identical pieces, you can be certain that each piece will be true . . . that it will be cut-off quickly, and at the lowest possible tool cost.

MARVEL Hack Saws are fine machine tools, with all the built-in accuracy this description implies. Designed to operate at higher speeds, with the heaviest feed pressures, they have almost unlimited power and stamina to stand up to the most severe service.

MARVEL Hack Saws are truly multi-purpose cutting-off machines. *No* run is too short or too long, *no* material too mild or too tough to be accurately and efficiently cut-off on a MARVEL Hack Saw.

Catalog C85 has complete details, facts and figures on both Marvel metal cutting Hack Saws and Band Saws. Write for it today.

S-1306

ARMSTRONG-BLUM MFG. CO.
5700 BLOOMINGDALE AVE. • CHICAGO 39, ILLINOIS

MARVEL Metal Cutting SAWS
Better Machines–Better Blades

lower your cost of possession

2 Nickel Alloy Steels provide

A simple plan to save money by Steel Standardization

How many types of steel do you normally use?

Chances are you should examine your needs for alloy steel to see how many can be satisfied with just two types, 4340 through-hardening and 4620 carburizing.

You are likely to find that most of your engineering requirements can be met with confidence when you *standardize* on these two general-purpose steels.

You simplify inventory and materials-handling. You save money in purchasing and production, too.

• 4340 stands alone among medium-carbon steels in its ability to provide maximum strength, ductility, toughness and resistance to fatigue in parts of medium to heavy section.

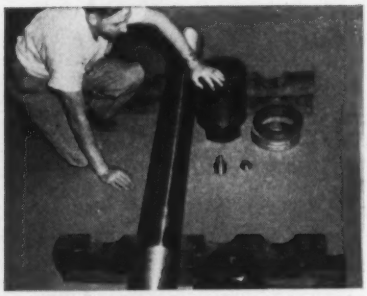
• 4620 is a carburizing type that has consistently proved itself the ideal steel for a wide variety of carburized parts. 4620 is easy to carburize and has a minimum tendency toward distortion in heat treatment.

Available From Steel Service Centers

Both 4340 and 4620 are stocked by Steel Service Centers from coast to coast, ready for off-the-shelf delivery in a variety of sizes.

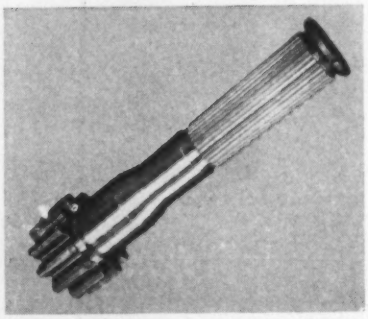
When you have carried your standardization plan as far as you can and you still have specialized needs to fill, the right nickel steels are available to give you extra performance or even lower costs.

For a buyer's guide to Steel Service Centers that stock 4340 and 4620, and other nickel-containing grades, simply write Inco.

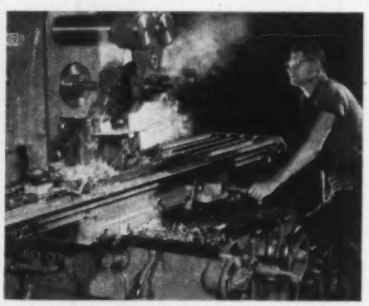


Holding the Shippingport nuclear reactor's top head to its shell section is a job performed by 42 studs of AISI 4340. This through-hardening nickel steel provides essential strength and toughness.

Power-packed tractor features unique drive mechanism composed of regular gear transmission, clutch and torque converter with lock-up, utilizes nickel alloy steels in more than 25 components.



Swing shaft for giant power shovel made from 4340 nickel alloy steel for strength and toughness to take shock-loading in stride. This 9″-diameter, 36″-long shaft of 4340 nickel alloy steel transmits tremendous torque to a giant ring gear.



Sustained accuracy is assured in this heavy-duty milling machine by spindle and gear components of AISI 4340 and 4620 nickel alloy steels. They provide needed strength and wear resistance.

INCO TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

STEEL SERVICE CENTER INSTITUTE

No Boom, No Bust in '61!

If you are apprehensive about business prospects for 1961, we heartily recommend studying the composite thinking and planning of metalworking managers presented in this issue of STEEL (Page 67).

As a group, they expect sales in 1961 of $153 billion vs. $146 billion in 1960, an increase of 5 per cent and an all-time high.

They expect sales in the second half of 1961 to exceed those in the first half by 3.3 per cent.

Their expectation of a rising trend, evident in the first half and carrying on through the second half, is amply supported by leading economists.

But larger sales volume during 1961, metalworking managers expect, will be accompanied by further increases in production and distribution costs that will not be fully covered by higher selling prices.

The result will be a further squeeze on profits that industry tolerates but cannot afford.

It is a squeeze that industry does not do enough about.

It can be relieved in two ways: By improving productivity and by more realistic pricing.

New equipment and processes now available can increase productivity in the range of 30 to 400 per cent.

Unfortunately, too many companies are trying to get by with what they have.

Price fighting is accentuated, not relieved, by the current buyers' market.

Unfortunately, too many companies still are worrying excessively over what competitors may or may not do, or when Sen. Estes Kefauver will start his next price investigation.

In coping with the no boom, no bust economy envisioned for 1961, you can draw these conclusions:

There will be a little more business available. It will be tougher to get, still tougher to make a profit!

Irwin H. Such
EDITOR-IN-CHIEF

CF&I WIRE HELPS PACKAGED for YOUR PRODUCTION

"CF&I Stem-paks cut machine loading time 80%... give us an extra hour of production every day," stated Mr. Frederick Voos, Plant Superintendent, Risdon Manufacturing Co., Waterbury, Conn.

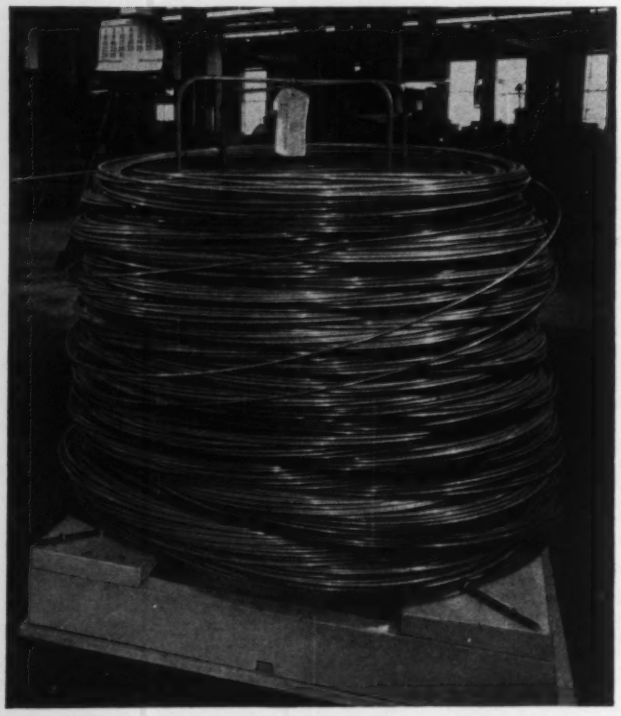
PROBLEM

1. "Our specially designed machines *were* fed wire from coils averaging 150 lbs. Because of the small size, frequent machine loadings were necessary. Each time, the coils had to be loaded by hand and the bindings clipped, after which the wire was guided through the straighteners before entering the machine. We were losing valuable production time due to excessive machine downtime," explained Mr. Voos.

SOLUTION

1. "Our Purchasing Department called a CF&I salesman who carefully examined our operation and recommended that we switch to CF&I Stem-paks which hold up to 1,000 lbs. of one continuous length of wire. Each Stem-pak feeds a machine for an average of one to two days... a production time equal to using seven coils with set-ups in the past.

"Stem-paks give us approximately an extra hour of production per day on each machine," Mr. Voos pointed out. "A Stem-pak can be set up in one-fifth of the time required for the seven coils of wire formerly used... *a saving of 80% on loading time.* The extra hour of production represents a 12½% increase in the operator's production time."



CF&I Stem-paks are delivered on pallets for fast unloading and easy in-plant handling by fork trucks.

PROBLEM

2. "Part of our operation required the use of wire that was free from rust, grease or dirt. Too often, unprotected coils would collect dirt in transit or storage.

SOLUTION

2. "CF&I Fibre Drums are an ideal answer to the problem of unclean wire. The sturdy Fibre Drum has a metal cover and locking band which seals the drum, protecting the wire from grime and from corrosive elements. In addition, Fibre Drums hold up to 600 lbs. of one continuous length of wire which enables us to run our machines for a longer time than when we used small coils."

Stem-paks and Fibre Drums are just two of nine wire packages that CF&I offers to help make your operation more efficient and economical. When you order from

INCREASE PRODUCTION 12½%

at Risdon Manufacturing Co., Waterbury, Conn.

Risdon Mfg. Co. also uses CF&I Fibre Drums, which hold up to 600 lbs. of wire, for special operations. The sealed Fibre Drums protect the wire against rust and contamination during transit and in-plant storage. Note how closely the Fibre Drums can be placed to the machine and how evenly the wire pays off.

A Stem-pak is easily placed in storage alongside Fibre Drums. No messy storage problems... no chance of coils becoming tangled. Inventory of this neat, compact storage set-up is a quick, simple counting job.

CF&I, you can specify wire *packaged for your production* to give you one or more of these benefits:

- **less downtime through extra-long continuous lengths of wire**
- **compact storage and simplified inventory control**
- **fast unloading and in-plant handling**
- **assured cleanliness of the wire**
- **smooth pay off of the wire**

A CF&I salesman will be glad to assist in selecting the *right* wire package for your operation. There's no charge for this service, so call our nearest sales office today.

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

CF&I STEEL

In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Farmington (N. M.) Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco San Leandro • Seattle • Spokane • Wichita

In the East: **WICKWIRE SPENCER STEEL DIVISION**—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

CF&I OFFICE IN CANADA: Montreal • **CANADIAN REPRESENTATIVES AT:** Calgary • Edmonton • Vancouver • Winnipeg 7021

32 Clevelands keep 450-ton ladle cranes on the job at Geneva Works

Moving big tonnage up and down, forward, backward and sideways is all in a day's work for 32 Cleveland built-in drives installed on the bridge and hoist of these 450-ton ladle cranes. These and many other Cleveland Worm Gear Drives and Speed Reducers can be found throughout the mill driving pushers, levelers, edgers, conveyors and other cranes.

Because of their established "long-life" service records, Cleveland drives are recognized leaders for keeping maintenance and replacement costs to the absolute minimum. Contact a Cleveland Field Engineer, or write for Bulletin 145 describing how Cleveland Worm Gear Drives solve tough production problems and reduce maintenance costs.

Cleveland Worm & Gear Division
Eaton Manufacturing Company
3270 East 80th Street • Cleveland 4, Ohio

EATON

CLEVELAND
Worm Gear
Drives

WHAT METALWORKING EXPECTS IN 1961

Managers See 5% Sales Upturn

PLODDING PROSPERITY is in prospect for metalworking during 1961. Look for a good year—with sales up about 5 per cent from 1960's, profits up less than 2 per cent—but expect a fiercely competitive year—in which price hikes will be hard to push through and foreign goods will pour into the U. S. in greater volume.

That's the consensus of the men who manage metalworking. STEEL asked 7450 general managers of metalworking plants how they expect their plants to fare during 1961. The answer:

- Sales will edge up to a record $153 billion.
- Profit margins will narrow dangerously.
- Sales in 1961's second half will top those in the first half by 3.3 per cent.
- Defense production will climb nearly 4 per cent.
- Export sales will rise only about 1 per cent.
- Unit manufacturing costs will increase 2.7 per cent.
- Sales and distribution costs will rise slightly.
- Prices will hold nearly stable.
- About 2 per cent more workers will find metalworking jobs.
- More than 1 out of 3 plants will expand.
- More dollars will go into research and development.
- Managers are seeking ways to expand profits—through sales boosting and cost trimming procedures.
- Price fighting, foreign competition, and union demands are metalworking's three biggest concerns.

On the next six pages, you'll find detailed expectations for all major metalworking industries. A few points are common to all:

● **The Profit Squeeze**—For several years, metalworking has been unable to raise prices enough to cover increased costs. Another such year is coming. The managers surveyed by STEEL look for manufacturing costs to climb 2.7 per cent and marketing costs to edge up 1.6 per cent. But the managers will hike their selling prices an average of only 1.1 per cent.

The obvious result: Less profit per dollar of sales. The managers expect dollar volume of sales to rise an average of 4.9 per cent in 1961 vs. 1960. But they expect after-tax profits to inch up only 1.7 per cent. Volume production will not offset rising costs during 1961. Crux: Higher unit costs, lower profit per unit sold.

The challenge is clear: Metalworking managers must find more efficient ways to create, make, and market their products.

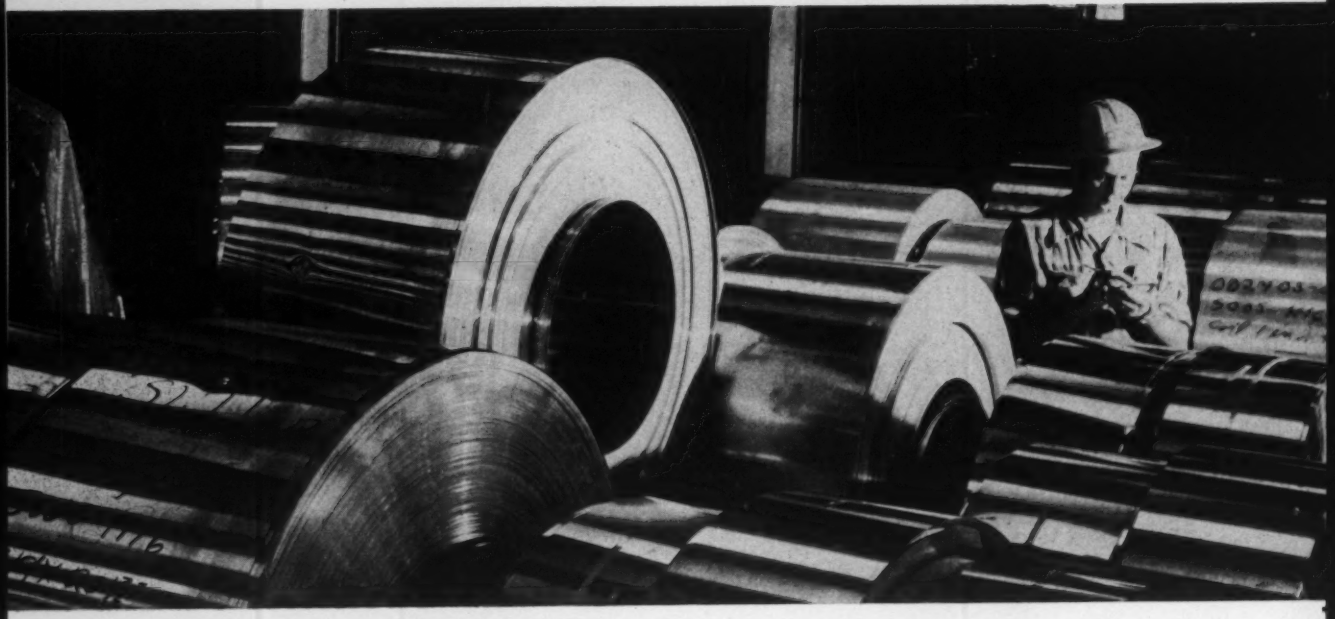
How to do that? These approaches stand out:

- The purchase of more efficient production equipment.
- Tighter control over materials—to reduce scrap, pare inventory costs, hold down acquisition costs, simplify and eliminate material handling.
- Seek greater labor productivity. Look for more metalworking managers to actively and sincerely try for union co-operation in improving productivity.
- Weed the whitecollar army. More and more firms will take a closer look at each member of the mushrooming army of whitecollarites that has invaded their organizations. Some will have to go. Others will be forced to spend their time more productively. The only gage: Each individual's contribution to profits.

● **Foreign Competition**—No metalworking industry is any longer free from foreign competition. It's the biggest single problem facing 1 of every 7 managers in the metalworking industries. For most other managers, it ranks second in concern only to price fighting or union demands. Tips on how to tackle the problem are found in STEEL's special Sept. 5 issue.

(*Please turn to Page* 68)

PRIMARY METALS (S. I. C. 33)



FABRICATED METAL PRODUCTS (S. I. C. 34)

1961 vs. 1960

Sales	Up 4.0%
Prices	Up 0.6%
Employment	Up 0.6%
Net Profits	Up 1.0%
Capacity	Up 4.9%
R&D Spending	Up 1.7%

● Primary metal producers are less optimistic about sales and pricing prospects for 1961 than any other major metalworking group. Holding prices down: Fierce foreign competition and rugged rivalry among producers of competing materials.

Foreign competition is the other critical concern of primary metal producers. They face a greater erosion of markets than do most metalworking industries. Reason: The foreign attack hits them in many areas. Take the steel industry. Its exports have declined while steel imports have risen. But that's only a small part of the problem. Imports of cars, typewriters, sewing machines, fasteners—all products containing steel—rob the domestic industry of markets. The trend in imports is up. In basic metals alone, managers look for imports to rise in 1961; they look for exports to drop 3.4 per cent. Only 1 in 10 expects his plant's exports to be higher next year than this year.

Other trends: Managers expect their second half dollar volume of sales to be 2.1 per cent above that of the first half. They predict an average rise of 2.8 per cent in manufacturing costs, 1.3 per cent in marketing costs.

1961 vs. 1960

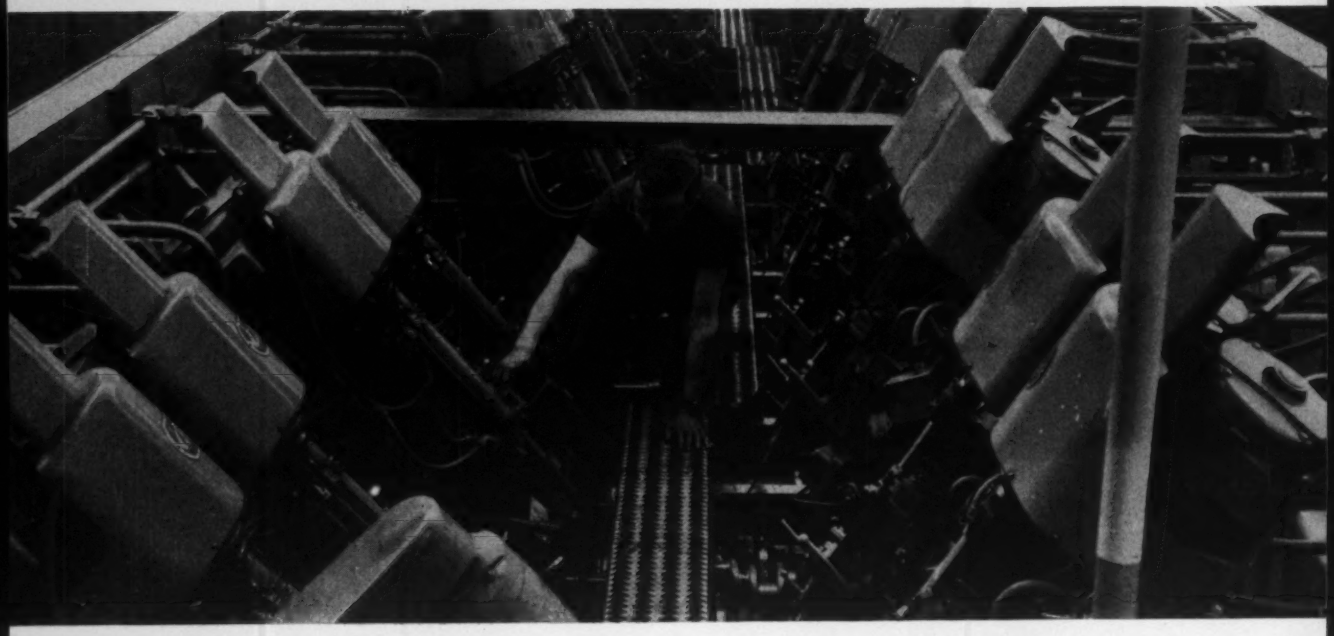
Sales	Up 4.7%
Prices	Up 1.0%
Employment	Up 3.0%
Net Profits	Up 1.5%
Capacity	Up 4.0%
R&D Spending	Up 1.8%

● Severe price fighting prevails in nearly every segment of this heterogeneous industry. Makers of cutlery, hand tools, plumbing goods, stampings, springs, fasteners, and other products list price fighting as their No. 1 problem. They mention union demands as another big problem in the year ahead. Many firms in this industry are relatively small and complain that they cannot pay the price of pattern settlements being forced upon them by big unions. Foreign competition worries them too—especially makers of cutlery, fasteners, and hand tools.

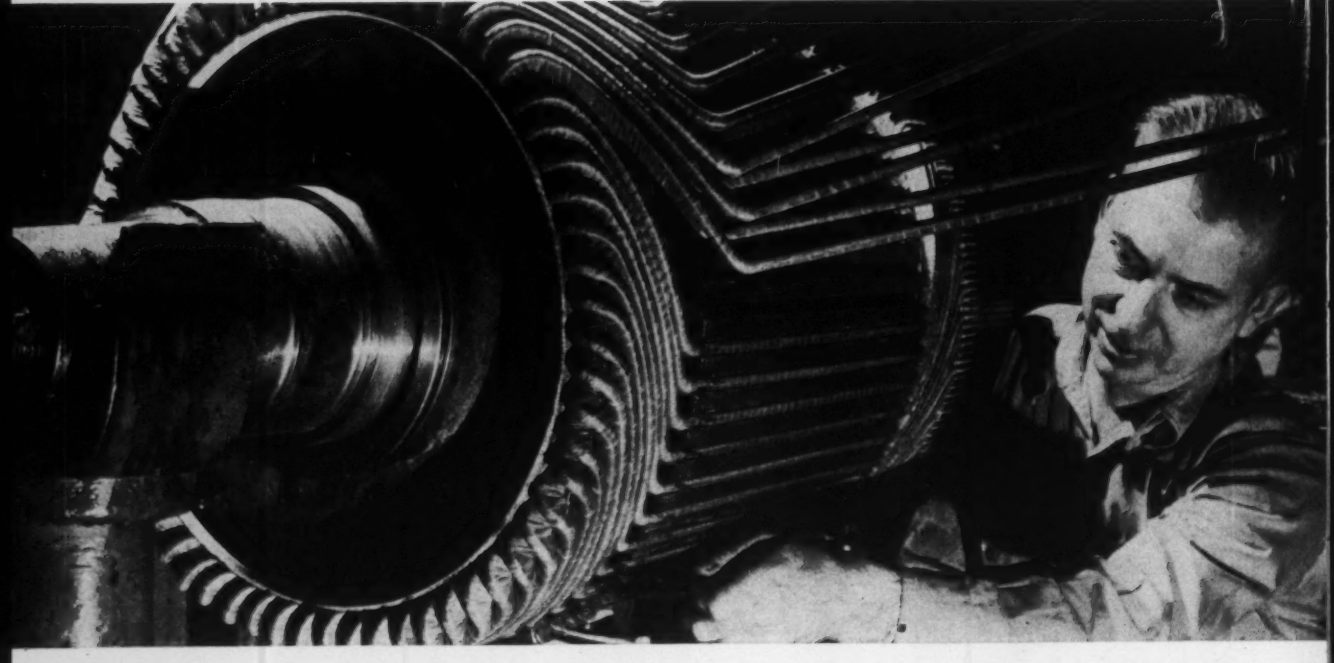
This industry is the most optimistic about 1961's second half, one of the least optimistic about the first half. The average manager expects his plant's sales volume in the second half of '61 to be 4.6 per cent greater than those in the first half.

Other predictions made by the managers of the fabricated metal products industry: Exports will rise less than 1 per cent. Unit manufacturing costs will increase 2.8 per cent. Sales and distribution costs will rise 1.5 per cent. The supply of skilled workers will be inadequate. Production capacity will increase 4 per cent.

MACHINERY, Except Electrical (S. I. C. 35)



ELECTRICAL MACHINERY (S. I. C. 36)



1961 vs. 1960

Sales . . . . . Up 4.8%

Prices . . . . . Up 1.3%

Employment . . . Up 1.8%

Net Profits . . . . Up 1.6%

Capacity . . . . . Up 3.3%

R&D Spending . . Up 2.7%

● The confidence in a sales upturn registered by producers of nonelectrical machinery and equipment augurs well for national prosperity. Reason: This is the biggest segment of metalworking (in number of establishments and in value added by manufacture) and its markets are broad—business, industry, farm, home.

The average manager in this industry expect his plant's 1961 dollar sales to be 4 per cent greater than those of 1960. He looks for the second half to be 2 per cent better than the first. He expects his export sales to hold steady, his defense production to be down 2 per cent.

Like all other segments of metalworking, he expects a tighter squeeze on profits. He looks for his manufacturing costs to rise 3 per cent, his marketing costs to edge up 1.8 per cent. He looks for after tax profits to be up only 1.6 per cent.

Other trends in this industry: 1 in 3 plants expects a shortage of skilled workers; 1 in 4 expects an engineer shortage; 1 in 5 foresees a dearth of managerial personnel . . . 2 in 3 plants will introduce new products.

1961 vs. 1960

Sales . . . . . Up 6.3%

Prices . . . . . Up 1.0%

Employment . . . Up 3.0%

Net Profits . . . . Up 1.5%

Capacity . . . . . Up 5.4%

R&D Spending . . Up 3.2%

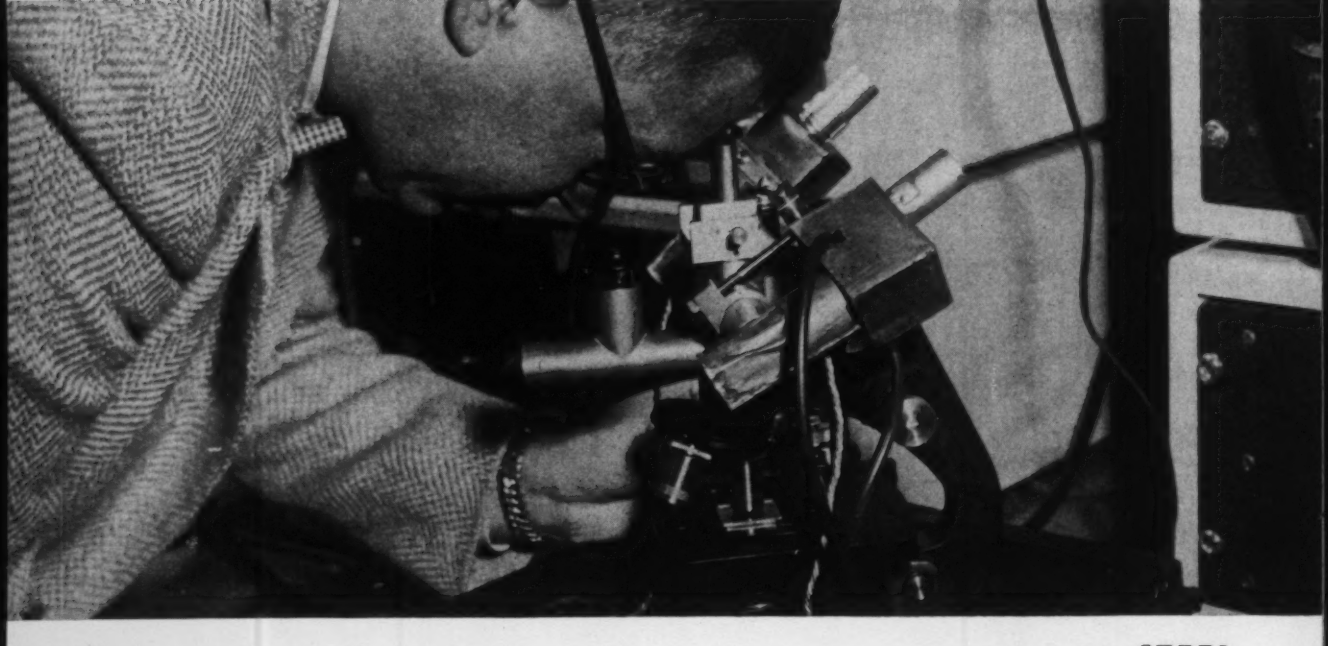
● Makers of electrical machinery and equipment look for their 1961 sales to be 6.3 per cent greater than those of 1960—the most optimistic forecast of all industries surveyed. But after tax profits are expected to rise only 1.5 per cent. The managers see the big gains coming in the second half—average estimate is for second half sales to be 4.2 per cent greater than those of the first half. The average manager expects his export sales to rise about 2 per cent, defense production to be up nearly 8 per cent. (About 52 per cent of the plants in this industry produce for export; 55 per cent are engaged in defense production.)

This industry's traditionally high investments in research and development will result in new products being introduced by 4 out of 5 plants during 1961.

The average manager expects his plant's unit cost of manufacturing to rise 2.6 per cent next year, sales and distribution costs to increase 1.9 per cent . . . 1 in 5 plants expects a shortage of engineers . . . 4 in 10 plants will hike their manufacturing capacity—total increase: 5.4 per cent.

TRANSPORTATION EQUIPMENT (S. I. C. 37)

INSTRUMENTS & RELATED PRODUCTS (S. I. C. 38)



1961 vs. 1960

Sales . . . . . Up 4.9%

Prices . . . . . Up 1.5%

Employment . . . Up 0.2%

Net Profits . . . . Up 1.8%

Capacity . . . . . Up 4.1%

R&D Spending . . Up 2.0%

● Encouraging demand for 1961 autos, anticipated hikes in government spending, and some indication that the railroads are improving their financial position prompt producers of transportation equipment to predict that 1961 sales will be nearly 5 per cent greater than 1960's. The average manager expects his second half sales to be 2.3 per cent greater than those of the first half.

The managers in this industry paint a more encouraging picture of international trade than those of some other industries. Only 1 in 10 managers lists foreign competition as his No. 1 problem. And the average manager expects his 1961 export sales to be 2.5 per cent greater than those of 1960.

Other predictions: Defense production will rise nearly 5 per cent . . . Unit manufacturing costs will climb 2.6 per cent . . . Sales and distribution costs will increase 1.2 per cent . . . 1 in 4 plants expects a shortage of skilled workers . . . 57.6 per cent of the plants will bring out new products during 1961.

An extra copy of this seven page section is available upon request. Write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

1961 vs. 1960

Sales . . . . . Up 6.1%

Prices . . . . . Up 1.3%

Employment . . . Up 3.3%

Net Profits . . . . Up 4.0%

Capacity . . . . . Up 3.3%

R&D Spending . . Up 3.3%

● Makers of instruments and related products (such as photo equipment, watches and clocks, ophthalmic goods) are much concerned about foreign competitors who are tightening their hold on larger segments of the domestic market. But this industry still expects its 1961 sales to be 6 per cent greater than this year's. And it expects 1961 export sales to rise 3.3 per cent above the 1960 level. The average manager thinks his second half sales will be 4.6 per cent greater than those of the first half.

Defense spending will play a major role in this industry's prosperity. The average manager says his 1961 defensework volume will be 10 per cent greater than that of 1960.

Other predictions: Unit manufacturing costs will rise 1 per cent, marketing costs will climb 2.3 per cent . . . 1 in 3 plants faces a shortage of skilled workers; nearly 2 plants out of 5 anticipate a shortage of engineers; 3 plants in 10 lack adequate managerial personnel . . . 2 plants in 5 will hike production capacity . . . 4 of every 5 plants will introduce new products . . . Price fighting is intense in most lines.

Eight Steps to Marketing Efficiency

At the Boston Conference on Distribution, Robert J. Eggert*, marketing research manager, Ford Motor Co., outlined eight actions which he says can increase the efficiency of your marketing process (or distribution function). . .

1. Get Common World Language

"Schools in every country should teach not only their own language but also a second language which would be common throughout the world. Such groups as the United Nations and the International Chamber of Commerce could assist in furthering this major opportunity of achieving faster gains in international marketing efficiency," says Mr. Eggert.

2. Use Metric System

Mr. Eggert urges the establishment of the metric system on an international basis. Since comparable weights and measures are an important part of marketing, standardization is vital.

3. Shift Chore to Consumer

"In the food field, part of the sharp increase in marketing efficiency has come from passing a part of the marketing function back to the housewife. Other marketers should take advantage of the increased amount of leisure time by making the purchase situation so attractive that part of the marketing costs are shifted from the business firm back to the consumer," Mr. Eggert advises.

4. Seek Serviceability

Mr. Eggert urges that manufacturers try to design "easy to replace" parts into household appliances. He cites the auto industry's move to "bolt on" fenders for economy models as the kind of step appliance makers could copy.

5. Destroy Artificial Barriers

"More attention must be given to institutional and governmental barriers to marketing efficiency," asserts Mr. Eggert. Example: Notice the long lines of trucks waiting at state highway weighing stations. "The tieup of the driver's time, the capital investment in the truck, and the investment of goods in the truck must certainly offset, in many cases, the advantage of the governmental agency having the precise weight," Mr. Eggert contends.

6. Combine Services

Mr. Eggert suggests combining the services of expensive door to door delivery. Example: Let one man serve as breadman and milkman.

7. Adopt Mechanical Aids

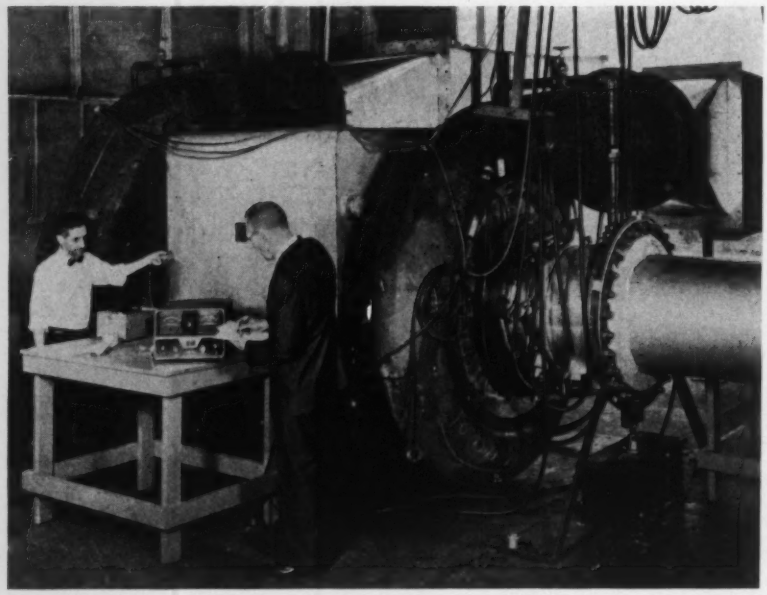
"Perhaps the development of 'autobution' in the distribution field will some day be as important as 'automation' has been in manufacturing," Mr. Eggert suggests. He points out that the vending machine industry has grown rapidly and can be expected to grow even faster in the decade ahead. He notes that electronic computers already contribute to reducing inventories and to speeding the analysis of factual data that aid in increasing marketing efficiency.

8. Expand Marketing Research

Mr. Eggert strongly advocates expanded use of marketing research as a tool in anticipating customer satisfaction and in measuring marketing efficiency.

He points out that the function of the marketing researcher in industry is "to learn as much as possible about customer preferences, and then serve as the typical customer's representative in the deliberations of management. His role is to interpret the customer to management, to provide factual information which reduces the necessity to travel on hunch or conjecture or to rely on observations of the past. In essence, his job is to minimize the uncertainty in management decisions."

*Mr. Eggert forecasts sales of 6.3 million domestic cars in 1961. See Mirrors of Motordom, Page 87.



DUAL CENTRIFUGAL COMPRESSOR UNIT provides both combustion air and cooling air for an iron ore pelletizing furnace. It was manufactured by the Industrial Div., American Radiator & Standard Sanitary Corp., Dearborn, Mich., for a large Eastern steel producer. The equipment consists of a pair of centrifugal compressors driven by a common, double end, electric motor. The larger of the two blows combustion air for furnace operation, while the smaller cools pellets as they are discharged

Steel Pay Paradox: Hike For Some, Cut for Others

SOME STEELWORKERS will get pay boosts on Dec. 1. But workers who have been laid off may get less "pay" via Supplemental Unemployment Benefits because the funds are being depleted.

Those working will receive increases of 7 to 13 cents an hour (average, about 9 cents) as a result of the labor contract signed last January. The increase will push average pay to $3.20 an hour.

• **Long Layoffs Hurt**—Under the complex formula governing the financing of SUB, the disbursement of supplemental benefits begins to taper off when the drain cuts the reserves below a fixed level. The heaviest drain comes when large numbers of workers have been idle so long that they have exhausted their regular state payments and are depending solely on SUB. That has been the case with many of the 50,000 now idle in basic steel. Supplemental payments average $21.66 a week for those still drawing state benefits and $48.42 for those who have used up their public rights, which run a maximum of 26 weeks in most steel states. Some $132 million has been disbursed in the three years the steel program has been in effect.

U. S. Steel Corp. and eight other large companies will have to cut their payments by 25 per cent or more next month. A few smaller firms have already done so. Unless business improves dramatically, most of the rest of the industry will have to do likewise by early February.

• **Escalator Boost?** — The general raise may be supplemented by additional cost of living payments of up to 3 cents an hour. But under the modified cost-of-living clause signed last January, the companies can offset the escalator obligation if they can show that they are paying more than they did last January to finance employee health and welfare insurance. None of the increase in insurance charges will come out of the basic wage hike, regardless of how much that cost has risen.

If the government's cost of living index for October (not yet released) remains at the September level, union members will be entitled to the maximum 3 cent cost of living increment. However, steel companies are claiming that their insurance costs have gone up more than enough (some say 4 cents an hour) to cancel out the increase.

Reasons: 1. When a lot of workers are laid off, total costs go up substantially because the men are still covered. (Hourly cost of insurance is determined by dividing the cost into manhours worked.) 2. The contract signed in January contains a new benefit—company financed hospital and surgical protection for laid off workers up to six months after layoff.

As of presstime last week, experts representing the United Steelworkers and the industry had been unable to agree on the extent to which the companies are entitled to cancel all or part of the escalator adjustment.

AEC Grants $1.5 Million To Push Atomic Studies

The Atomic Energy Commission has approved grants for more than $1.5 million to 113 colleges and universities for the purchase of laboratory equipment and to initiate or expand nuclear educational programs.

The program, now in its fourth year, is designed to train students for the atomic energy field and give instruction to science and engineering students.

The commission is tentatively planning another series of grants in April, 1961.

No Report Expected On Work Rules Study

THE WORK RULES issue is still as thorny as it was during the 116 day steel strike.

The union-industry committee set up to study the problem is supposed to submit its joint recommendations day after tomorrow (Nov. 30), but such a meeting of the minds is highly improbable. Two other possibilities:

1. The deadline may be extended.
2. The two sides may issue separate reports.

The talks got off to a rocky start when union and management representatives were unable to agree on a third party—a neutral chairman who might help them reach unanimity on some of the issues.

Despite the setback, R. Heath Larry, U. S. Steel Corp.'s administrative vice president-labor relations, and Marvin Miller, assistant to David McDonald, the United Steelworkers president, have had several meetings.

Object: To "study local working provisions of the contract and their application . . . and to make recommendations to the parties for such action as the parties may mutually agree upon."

The committee is charged with finding the facts and reporting them so that negotiators will have a clear idea of what impact certain work rule changes would have on industry employment and efficiency.

The industry wants relief from Section 2B of the contract, which binds it to continue work practices previously agreed upon. The union argues that 2B is a vital safeguard to workers and jobs. It would like to tighten up the clause so mangement can't displace workers even after it has installed new equipment.

Chances appear slim that there will be any serious negotiations on work rule changes until the two sides start hammering out the next contract in 1962.

Ike Attacks Balance of Payments Deficit

He wants to slash expenditures such as . . . .

Overseas Procurement by International Cooperation Administration

(Millions of dollars)

Fiscal 1960

Iron & steel products	$ 75.6
Nonferrous products	9.1
Machinery & equipment	83.9
Transportation equipment	44.4
Nonmetalworking items	294.0
Total	$507.0

THE PRESIDENT has launched one of the most significant shifts in U. S. trade and aid policy since World War II.

He intends to swing closer to a "Buy American" policy where U. S. dollars are involved and has sent Under Secretary of State C. Douglas Dillon to Europe to convince our Western allies that he is serious about stopping the drain on our gold reserves.

President Eisenhower has also asked all government agencies to review their operations and take steps to cut foreign procurement as much as possible.

The Commerce Department reports: In the third quarter, our exports were running at an annual rate of $20 billion, imports $15 billion. But transfers of gold and liquid dollar assets abroad resulted in a $4.3 billion deficit (annual rate) in our balance of payments—more than $1 billion higher than earlier estimates. Our deficit in 1959 was $3.8 billion.

Under Secretary of State C. Douglas Dillon is trying to get Western allies to pick up a bigger share of the foreign aid tab to halt the drain on U. S. gold reserves

● **WHERE DOES THE GOLD GO?**—The International Cooperation Administration spends more than $500 million a year overseas (see table). More than 40 per cent of the money is for metalworking products.

The Defense Department estimates it is contributing $1.2 billion a year to foreign economies—$25 million for the overseas purchase of major equipment, $500 million for material, $690 million for contractural services.

The President foresees an eventual $1 billion saving per year by cutting $500 million worth of spending on military dependents living abroad, more than $300 million in foreign aid, and almost $200 million in purchases of such items as high fidelity equipment and cameras by overseas post exchanges.

● **"BUY AMERICA" MAY COST MORE**—A knowledgeable source in the Treasury Department told STEEL that most officials recognize the new policies will cost the Treasury more because of higher U. S. prices. But, he points out, foreign aid is certain to continue at current levels. The new White House directives are a matter of emphasis. In the past, overseas procurement was encouraged by an economy minded Budget Bureau. Now, the bureau's desires have become secondary to the need to Buy American—something many U. S. metalworkers have long sought.

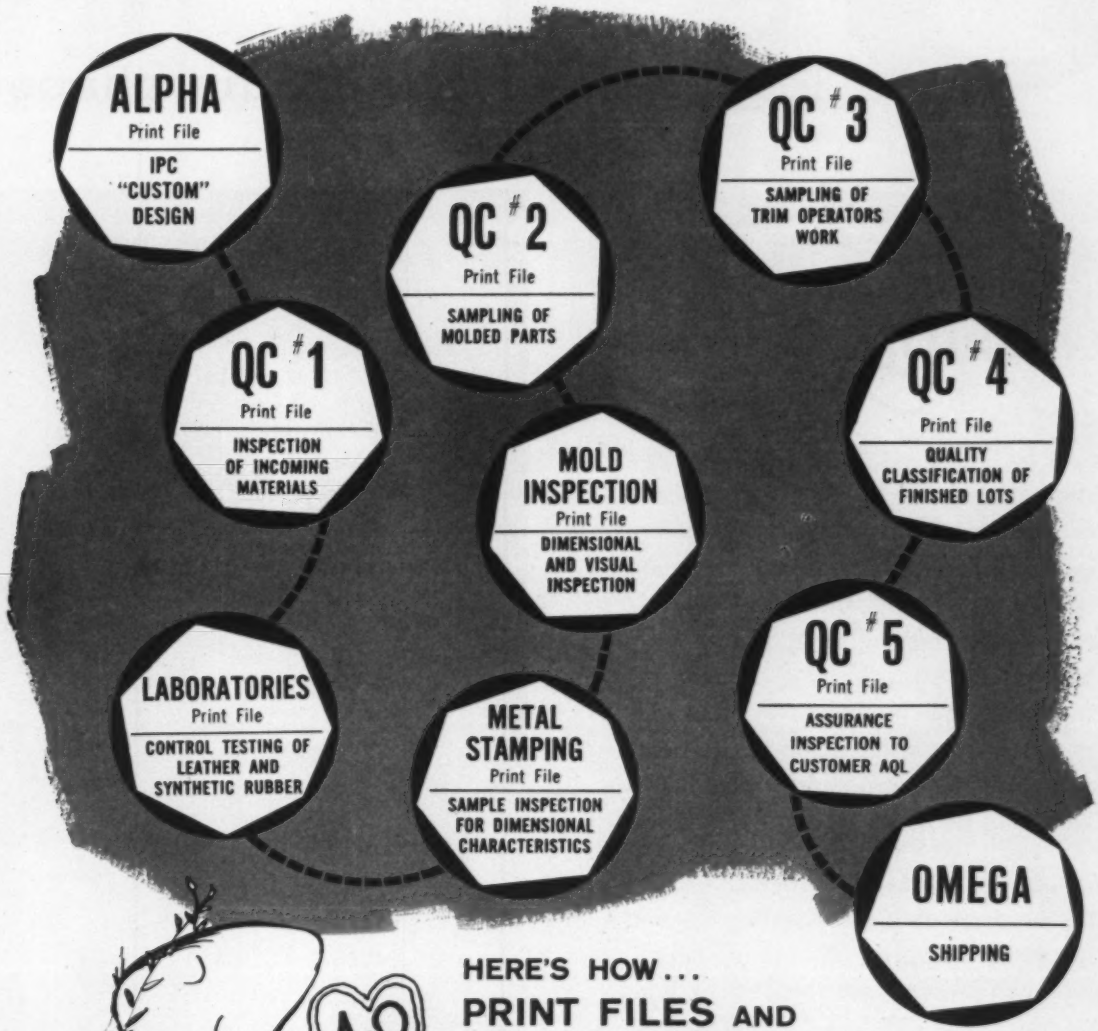
One easy way to help implement the program: Write government specifications to favor U. S. bidders. On many occasions, they have aided foreign competitors.

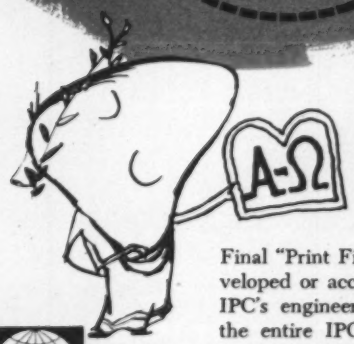
● **MR. DILLON HAS A ROUGH JOB**—Under Secretary Dillon is talking turkey. He wants Germany's $1 billion, foreign aid program for underdeveloped countries to be free of a "Buy German" restriction. He also wants Germany to boost its contribution to the North Atlantic Treaty Organization by 50 per cent and to lower trade barriers against U. S. goods.

Our position: Western Europe is healthy, thanks to U. S. aid. It should pick up a bigger share of the tab for aid to underdeveloped countries. It stands to gain as much (or more) than the U. S. in trade with new nations that are hungry for manufactured products.

Mr. Dillon can deal with authority because he will probably be retained by the Kennedy administration. Washington observers believe he will serve as treasury secretary or chief of the International Bank for Reconstruction & Development.

From beginning to end... *and in between...* **IPC** controls quality in manufacturing OIL SEALS... PACKINGS... PRECISION MOLDING





HERE'S HOW... PRINT FILES AND QC STATIONS

Final "Print Files" for every product developed or accepted for manufacture by IPC's engineers are located throughout the entire IPC plant. These provide a positive, at-hand reference for product quality!

More than this . . . IPC maintains Q C (Quality Control) stations at strategic locations in the manufaeturing line *through which every batch of manufactured parts MUST pass* before they are committed to shipment.

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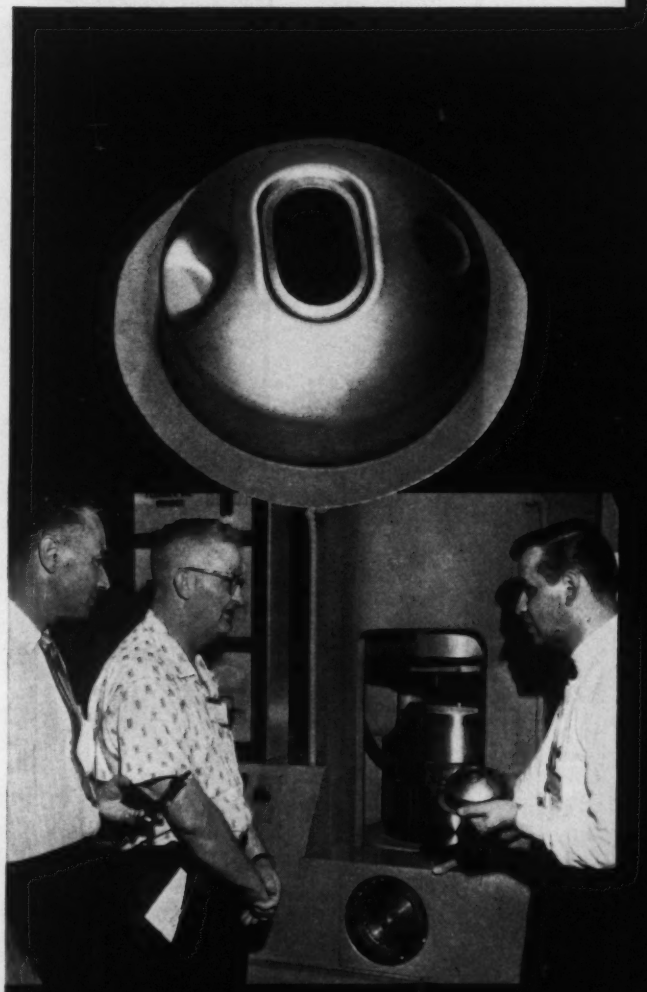
To learn of the latest developments in the field of chipless machining, and how you can apply its cost-reducing and quality-improving advantages to your metalworking, call in a Meta-Dynamics Division field engineer.



CINCINNATI HI-SPEED HYDROFORM

produces the housing shown to precision dimensions in a single 5-second draw cycle from an 8″ dia. blank of .047″ mild steel. Hydroform tooling normally costs 1/10 of conventional draw dies. The process produces parts of more intricate shape, having improved mechanical and physical properties, in far fewer operations than is possible in common practice. Hydroform machines are built in sizes for drawing blanks up to 8″, 12″, 19″, 23″, 26″ and 32″ dia.

META-DYNAMICS DIVISION

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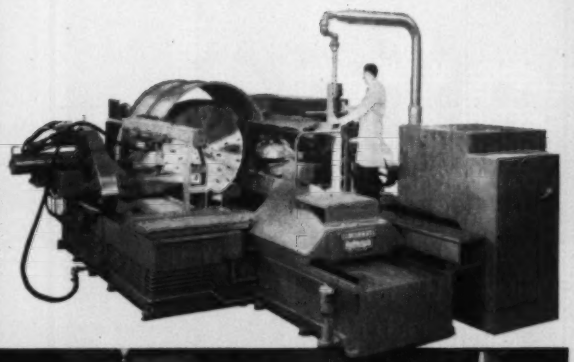
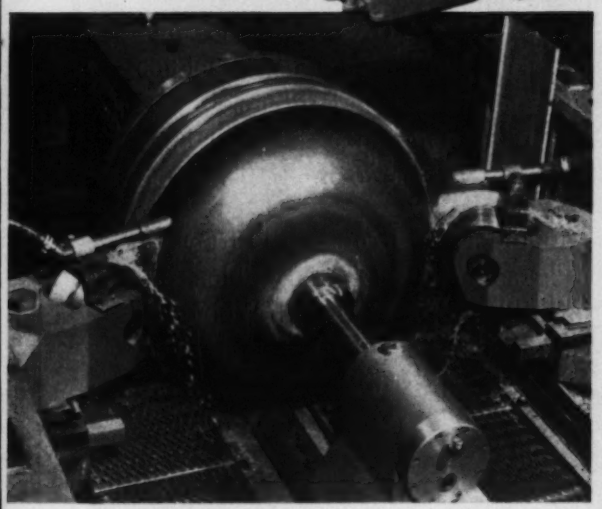
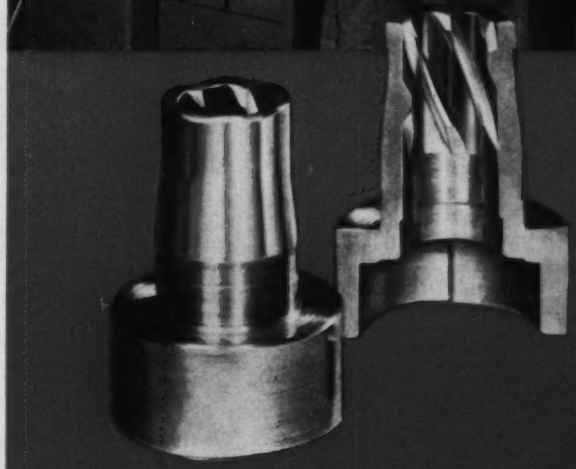




CINCINNATI HYDROSPIN

roll-flows metals into a wide variety of shapes having circular cross section. The metal undergoes severe shear deformation which results in a part possessing increased strength, hardness and resistance to fatigue. An example of Hydrospin savings: one user recently paid for his Hydrospin machine with the first 100 parts spun! Hydrospin machines are built in horizontal and vertical styles in various sizes and forces, including those capable of swinging 80″ blanks of 1½″ thick stainless steel.



CINCINNATI INTRAFORM

has reduced the dollar-eating hours of machining complex internal profiles, to a few cents worth of seconds! The automobile starter clutch housing shown above was Intraformed from a simple screw machined blank to produce the spline, bearing surface and cam profile, at the rate of 260 parts per hour, and at a tool cost of less than 1¢ per piece. Former tooling cost for the part was 45¢ each. Cincinnati Intraform machines are also cold working seamless and welded tubing to new highs in precision dimensional tolerances and finishes —are equally adept at reducing, sinking and the laminating of tubing.

Hendrick perforated metal

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ARMORGRIDS • HYDRO DEHAZERS • DISTILLATION COLUMN INTERNALS

Why Exhibit at Foreign Trade Fairs

- **Check pulse of international markets.**
- **Check for foreign technical breakthroughs.**
- **Make personal contacts with top management.**
- **Find a potential partner for overseas activities.**

MANY U. S. FIRMS are not using foreign trade fairs to full advantage as an overseas marketing technique, believes Dr. Max W. Clauss, director of foreign services for West Germany's Hanover Trade Fair. (British sources call it the world's leading market for machinery and other technical products.)

Dr. Clauss just completed a tour of the U. S. and Canada (under the auspices of the German American Chamber of Commerce, New York) to promote the fair, which will run from Apr. 30 through May 9, 1961. May 6 will be North American Day.

Last spring, 91 U. S. companies were among the more than 1000 non-German firms exhibiting. The fair is a combination of several specialized fairs. Goods are displayed by industry rather than by nationality.

Dr. Clauss feels that U. S. companies may not be sufficiently familiarizing themselves with local conditions before venturing into foreign markets. His comment on planned obsolescence: "It seems to be such a waste."

Venezuela Bids for U. S. Investments

Venezuela is courting U. S. manufacturing firms, reports William R. Hinkle, president of a Chemetron Corp. subsidiary in Caracas and the American Chamber of Commerce of Venezuela. Companies which locate in that country are favored by low taxation; their dividends are exempt; capital gains are treated as ordinary income; corporations are granted tax benefits when starting new industries; real estate is ordinarily taxfree except in cities, where the rate is 6½ per cent of the rental value; and an adequate work force is readily available. Mr. Hinkle adds: "Venezuela grants imports license, quota, and tax exonerations for manufacturing and processing machinery and raw materials."

Mr. Hinkle has this advice for firms interested in marketing products in Venezuela: Sell and ship only up-to-date merchandise; print instruction manuals and other pamphlets in Spanish; if it is possible, use the metric system; extend big trade discounts so merchandise may sell at competitive prices; credits should be extended to 90 or 120 days with the option of prompt payment discounts.

Aussies Challenge Canadian Drillmakers

Two Australian makers of high speed steel twist drills (Frost Engineering Co., Hamilton, Victoria, and Patience & Nicholson, Maryborough, Victoria) are carving out a substantial chunk of the Canadian market. They're selling technically competitive products at noncompetitive prices. Compounding the injury: The Aussies buy their special tool steel from Atlas Steels in Welland, Ont., transport it half way around the world to its Victoria plants for manufacture, then ship the tools back to Canada.

Intra-Common Market Trade Jumps 34%

Trade among the six member countries of the European Economic Community is booming. It was almost 34 per cent better in the first half than it was in the corresponding 1959 period. By comparison, the pace last year was 19 per cent above 1958's.

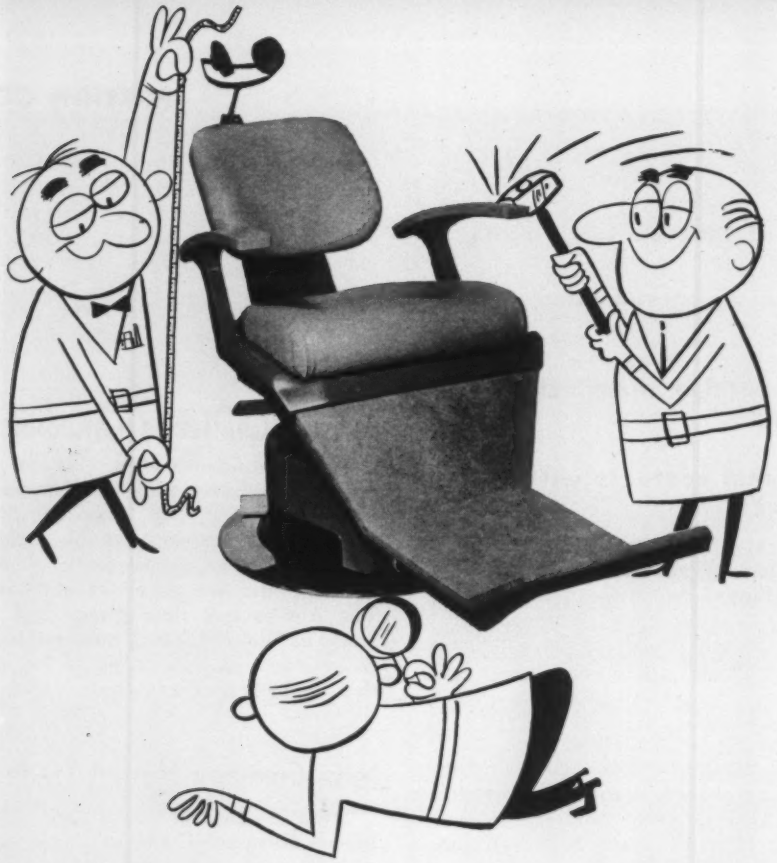
The impressive gains were not at the expense of trade with other countries. Imports from outside the community in the first half were nearly 24 per cent higher than they were in the like period last year. Exports increased 22 per cent. Italy and France showed the greatest increases in all categories.

Renault Appeals to U. S. Carmakers

Pierre Dreyfuss, president of Renault, France's largest automaker, has appealed to U. S. auto manufacturers not to "drop the atomic bomb of a small car" (Volkswagen-Renault size) on the European market. Mr. Dreyfuss warned that the U. S. industry could not afford to damage itself in economic warfare when it may also have to face a commercial assault from Communist countries.

Foreign Firms Get More Selective

A purchasing agent recently observed that many foreign firms now gearing for mass production are not interested in his business unless the orders are sufficiently large. Another view on world marketing: Dr. K. E. Mossner, vice president, Union of International Fairs, maintains: "Selling is no longer a matter of persuasion . . . but a deliberate effort to present the customer with a fair and competitive offer of technical and capital goods. In the long run, the buyer will decide on merit and not on persuasion."



Your Products Need Checkups Too

LIKE A PHYSICAL examination, periodic engineering audits can be used to assess the strengths and weaknesses of your products before they get sick.

Take the case of S. S. White Dental Mfg. Co., Philadelphia. "We wanted to get a new dental chair on the market as fast as possible," recalls W. F. Uhler, vice president, "because competitive conditions are really tight in our business. We had 60 men in our engineering group, but we had more projects than we could handle. Besides, we needed some new thinking on dental chairs."

White called in a "doctor," Designers for Industry, a Cleveland engineering firm, to do an engineering audit. In effect, the dental chair manufacturer added 200 men (electronic, mechanical, and fluid engineers) to its staff.

The objectives of such audits are listed by Robert Koslo, DfI project manager, who directed the White job:

- Improve product quality.
- Lower production costs.
- Increase utility.
- Increase sales appeal.
- Bolster design flexibility.

• **How It Was Done**—The scope of the project was determined by DfI. It outlined four basic steps in its approach:

1. Familiarization with White's product and engineering methods used in cost evaluation procedures.

2. Review and study of development drawings and the functional requirements of the working prototype. Purpose: To facilitate a comprehensive analysis of components and assemblies from an economical and practical standpoint.

3. Preparation of complete, detailed manufacturing drawings, along with data which would enable the firm to maintain quality and produce 2000 dental chairs a year at the lowest possible unit cost.

4. Building and testing one production sample following recommended specifications and procedures.

• **Task Force Assembled**—Mr. Koslo next assembled his team: Senior project designers, draftsmen, mechanics, and machinists. (All engineers and technical personnel at DfI were also at his disposal.) Mr. Uhler of White assumed overall command. Henry Dreyfuss & Associates, New York industrial design firm, produced the initial design.

DfI's assignment: An unbiased investigation of present and future products and product lines through measurement by product engineering, technical market research, design engineering, and production engineering.

Designers for Industry Suggest These 4 Phases Of an Engineering Audit

• **Plant Visits**—To get a thorough understanding of White's background, members of the DfI team visited the company's Princess Bay, N. Y., plant. They became familiar with the firm's policies, administration, product and production engineering procedures, production methods and facilities, and the costing system.

After classifying, reviewing, and analyzing data brought back from the initial trip, DfI came up with a set of questions and was able to determine the additional information it needed. Arrangements were made to revisit the plant. The details needed to intelligently program the project were subsequently developed.

By this time, the "necessary" work on functional design and the working sample was completed. DfI was then able to get the reaction of White's sales staff to the prototype.

• **Project Manager's Role** — DfI's project manager co-ordinated and supervised all work and functioned as liaison engineer to the client. He advised on the best use of present equipment, approved and interpreted design, drawings, and data.

• **Results**—The DfI team came up with seven improvements:

1. All functional parts, such as screw heads, are hidden.
2. Both arm rests are movable—they swing down, in, and out.
3. All lock and adjustments incorporate feather touch control.
4. Controls are more accessible.
5. The design makes cleaning easy.
6. The chair is smaller over-all and more comfortable.
7. It is more attractive.

The new chair is now in production.

Analysis to cut costs, improve product . . .

OBJECTIVES:

- Simplify the product and make it more functional.
- Reduce the number of parts and their size.
- Reduce the number and kinds of operations needed.
- Make optimum use of tolerances and finishes.
- Gain maximum interchangeability of parts.
- Use the most efficient materials and fabricating methods.
- Set up economical production runs.

Field survey of distributors, dealers, users to evaluate possible changes . . .

OBJECTIVES:

- To determine contribution of each function to value of product.
- Any functional shortcomings of product.
- Cost of each part in proportion to its usefulness.
- Which features should be retained.
- What can be "borrowed" from other industries.
- What parts should be investigated carefully for lower cost methods.
- What purchased parts appear to be overpriced.
- What dependable supplier will provide parts cheaper.
- Detailed performance specifications for optimum value and profits.

Design engi ering . . .

OBJECTIVES:

- Establish basic design to meet functional specifications.
- Interpret field information on trends.
- Insure against product obsolescence by incorporating design flexibility.
- Provide for future design modifications with minimum engineering change.
- Select, test, and prove out new or changed components.
- Integrate human engineering aspects with engineering and manufacturing requirements.

Production engineering . . .

OBJECTIVES:

- Provide data necessary to take advantage of newest materials and methods.
- Adjust the design to volume of production anticipated.
- Establish system of quality control.
- Establish amortization program for tooling.
- Provide production layout to insure proper flow and control of materials.
- Establish cost saving, inventory control methods.

Nickel Strip Rolled from Powder

NICKEL STRIP is being commercially produced by a new, continuous powder rolling technique at Metals for Electronics Inc., Hamden, Conn.

The firm is supplying nickel strip in coil form in thicknesses up to 0.025 in. and widths up to 7 in., says John T. Richards, president. Finished strip is averaging 99.9 per cent nickel.

Metal strip is conventionally produced by starting with an ingot which is melted and cast into billets suitable for hot or cold rolling. Intermediate rolling, annealing, and pickling are generally necessary to produce the strip.

Metals for Electronics is rolling the powder direct, eliminating those operations. Mr. Richards reports that his firm has rolled a dozen metals from powder with the new technique but is currently emphasizing nickel for the electronics market.

• **High Purity**—In the case of nickel, explains Mr. Richards, direct rolling of powder offers easier purity control than conventional melting and hot breakdown procedures.

"High temperatures associated with melting and hot rolling may introduce contaminating elements. It's frequently necessary to add deoxidizers during melting to prevent excessive metal loss and to control analysis. Purity of the strip compacted from powder is limited only by the purity of the original powder."

Some of the powders the firm is using are being produced from ores which are mined and refined in this country. Previously, all strip produced was made from imported nickel.

"Powder rolling dates back to 1902 when experimental work was done in Germany," Mr. Richards points out. "During World War II, iron powder was directly rolled into strip on a limited basis, and subsequent pilot plant work in Germany was extended to brass and copper . . . but dropped for economic reasons."

Metals for Electronics has applied for patents on its technique. It is also planning to produce coiled strip in wider sections than the present 7 in. maximum.

Indiana Lake Port Plans Hit Snag

Sen. Paul Douglas (D., Ill.) has succeeded in at least temporarily blocking a favorable report on the proposed Lake Michigan port in Porter County, Ind.

One of the legislator's aides told a "Save the Dunes Workshop" in Chesterton, Ind., that Senator Douglas has persuaded the Army Corps of Engineers to return its initial report to the district office in Chicago for further study and hearings.

Backing of the Army Engineers is needed for Indiana to get federal aid for the $80 million project. The Chicago office of the Army Engineers recently issued a report saying the port plan was feasible if certain conditions were met.

Senator Douglas has opposed the use of the Indiana dunes for commercial purposes. Midwest Steel Corp., a subsidiary of National Steel Corp., is completing a steel mill in the Burns Ditch area. Bethlehem Steel Co. also owns land in this general area. Indiana's Gov. Harold Handley recently expressed optimism concerning the construction of facilities by Bethlehem.

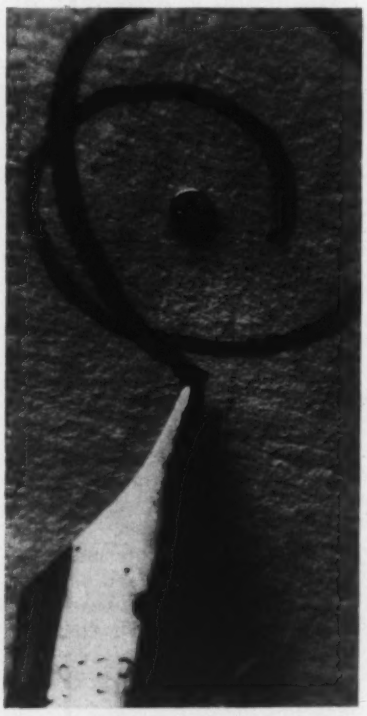
Linde Opens New 500 Ton On-Site Oxygen Plant

The construction of on-site oxygen plants for the steel industry continues to gain momentum (see STEEL, Nov. 21, p. 60). A 500-ton-a-day plant was started last week by Linde Co. (a division of Union Carbide Corp.) at Great Lakes Steel Corp., Ecorse, Mich.

The plant will supply 99.5 per cent pure oxygen for lancing open hearths, scarfing, and other operations.

The Ecorse plant is Linde's third major steel industry installation this year, bringing the company's on-site capacity for steelmaking oxygen to 3623 tons a day. Ten other on-site plants are under construction or being planned.

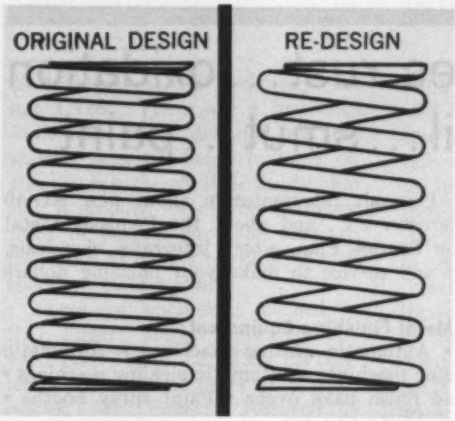
Great Lakes has enlarged and modified its open hearth furnaces and equipped 15 of 17 with oxygen roof lances.



SUBMINIATURE BEARING in center of circle is used in missile guidance system. New Departure Div., General Motors Corp., says balls are 0.01 in. in diameter

70 POUNDS OF SPRINGS

were just going along for the ride!



10 coils—.120″ wire
130 lbs. of wire per
1M springs

7 coils—.105″ wire
60 lbs. of wire per
1M springs

Because of mounting cost conditions, a user of motor-support springs asked for a complete design check. Redesigned by A.S.C. engineers, required stresses were met by a slight change in wire size, allowing a reduction in number of coils from 10 to 7. This meant a saving of 70 pounds of material per thousand springs. Because of the shorter length of wire, coiling and grinding speeds were increased, heat-treating time reduced. Saving to the customer—40%.

How about the springs you use? A consultation on your specifications costs you nothing. Just contact any Division of Associated Spring Corporation. For a handy reference to spring action, write for "Spring Design and Selection—in brief."

5904

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Raymond Manufacturing Division, Corry, Penna.
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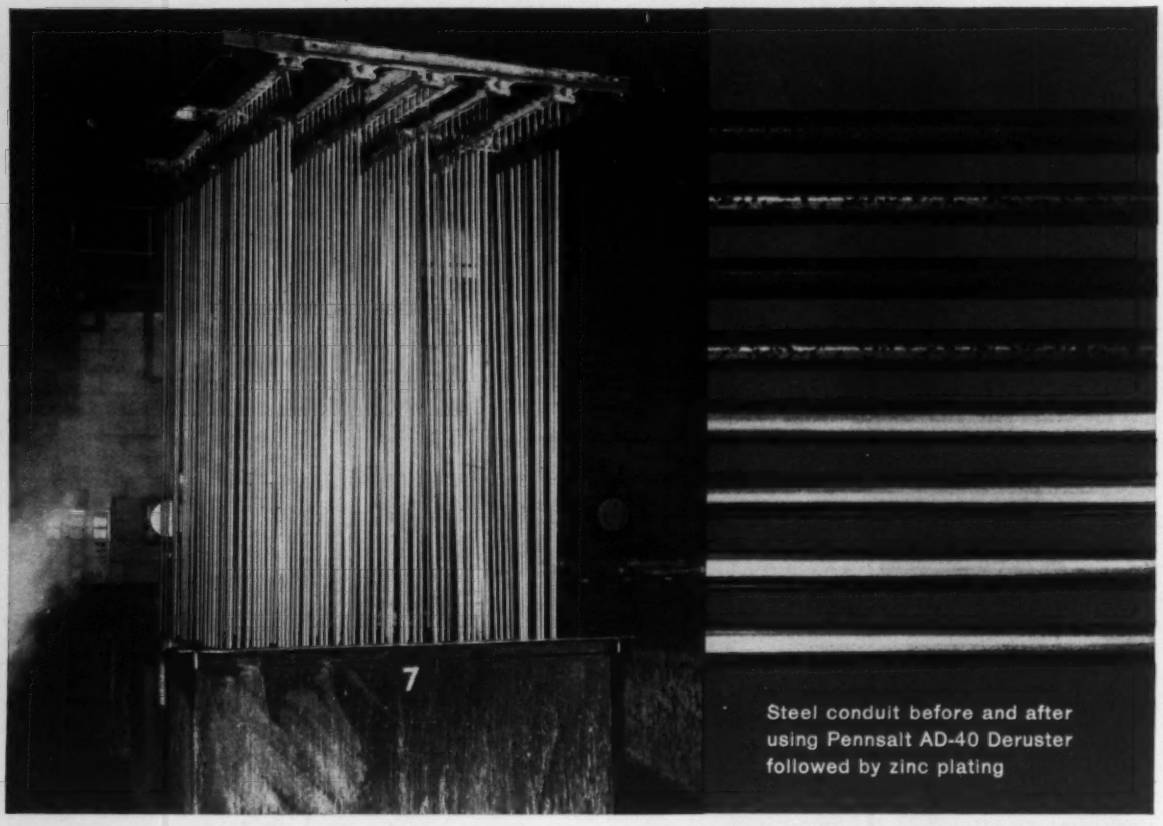
San Francisco Sales Office, Saratoga, Calif.
Seaboard Pacific Division, Gardena, Calif.
Cleveland Sales Office, Cleveland, Ohio
Dunbar Brothers Division, Bristol, Conn.
Wallace Barnes Steel Division, Bristol, Conn.

Canadian Subsidiary: Wallace Barnes Co., Ltd., Hamilton, Ont. and Montreal, Que. Puerto Rican Subsidiary: Associated Spring of Puerto Rico, Inc., Carolina, P.R.



Steel conduit before and after using Pennsalt AD-40 Deruster followed by zinc plating

New Pennsalt AD-40 removes rust... oxidation ...heat stains... burnt-on oil... smut... paint

Here's another new Pennsalt product to help cut your metal finishing costs. It's Pennsalt AD-40 alkaline deruster—the faster, easier way to remove rust and oxidation from steel and stainless steel . . . to remove heat treating stains from stainless . . . and to remove zinc and iron phosphate coatings. AD-40—with built-in cleaning action—also doubles as a paint stripper and a replacement for acid in plating cycles on steel. Here's what you'll get with Pennsalt AD-40:

- Efficient rust and oxidation removal
- Non-electrolytic action—no electric current required
- No waste disposal problems—no cyanide content
- Self-contained detergent system that aids cleaning action
- 100% active, water-soluble powder—no filler or water
- Shorter, simplified work cycle

Ask your Pennsalt representative about new AD-40 alkaline deruster . . . and about the Pennsalt Metal Preparation Service Plan, which integrates chemicals, equipment and service to make your finishing dollars go farther.

Pennsalt Metal Finishing Equipment
Washers • Automatic coating machines • Automatic phosphatizing machines • Automatic pickling machines • Drying and finish bake ovens • Paint spray booths • Complete finishing systems

Pennsalt Metal Processing Materials
Cleaners for all metals • Etchants and brighteners • Descaling and pickling compounds • FOSBOND® phosphatizing agents • FOSCOAT® pre-lubricant coatings • FOSLUBE® drawing lubricants • DRAWCOTE® deep-drawing lubricants • Paint strippers and strippable vinyl coatings

... a better start for your finish®

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Pennsalt Chemicals®
ESTABLISHED 1850

Ford's Marketing Manager Forecasts . . .

- **Sales of domestic-built cars, 6.3 million.**
- **Sales of imports, 400,000.**
- **Gross national product, $523 billion.**
- **Consumer disposable income, $368 billion.**

R. L. EGGERT

New Car Sales Rising 2.8% Yearly

COMPACT CARS definitely are not a fad. There are a few faint indications that demand for the smaller cars will begin to taper off shortly, but there's little doubt that they'll account for no less than one third of annual car sales through the 1960s as buyers continue to seek economy of operation.

Those are conclusions reached by R. J. Eggert, market research manager, Ford Motor Co. Like his contemporaries in the other auto companies, Mr. Eggert's research is aimed at determining what the auto market will be like next year and in other years to come. His findings can help automotive suppliers determine their roles.

Right now, Detroit is watching closely to see whether sales of 1961 models will reach projected levels that average out around 6.2 million domestic cars. Mr. Eggert is forecasting 6.3 million; he expects a moderate economic growth, but no boom.

• **Big Picture** — Several favorable factors are affecting the 1961 economy, reports Mr. Eggert. "Money will be easier to get and will cost less in 1961. Residential construction will improve somewhat as easier money filters down to the mortgage market. More new homes will spark recovery in household appliances and furniture. Government spending for goods and services will increase over $6 billion. A leveling of the downward inventory adjustments will help. Plant and equipment spending will continue at high levels, but is not expected to be as dynamic a force as in 1960."

On the unfavorable side, it appears consumers may have temporarily overborrowed. They've added more than $9 billion to their short term debt this year. Borrowing now is at $5.5 billion annual rate. Whether consumers go further in debt may depend partly on how easy credit gets. Unemployment continues at a high rate and probably will go higher next year (see STEEL, Nov. 21, p. 59).

• **Weighing the Factors**—Applying those factors to the auto market, Mr. Eggert says that the plus side shows an expected 2.5 per cent increase in consumer after-tax income which will provide a bit more money for durable goods purchases. It also will help maintain consumer confidence. The introduction of four additional domestic economy cars tends to sustain the new car market. More than 7 million families (19.5 per cent of all car owning families) now own more than one car and the economy autos should accelerate growth in that area. Another 1.7 per cent own three automobiles. Styling changes should help create more interest. The anticipated high dealer inventories in January (around 1 million units) may contribute to earlier sales contests and price discounting which will attract buyers.

On the other hand, bulging used car stocks make it more costly for buyers to trade in their old cars on new models since they won't get as big allowances as when demand for used cars is high. After the first of the year, sales may slump slightly because fewer price and style

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choices will be available after 1960 cars have been sold off. Many people extended their car loans this year and they won't be ready to re-enter the market until those debts have been paid. "Consumer intentions to buy new cars are below seasonal levels. Intentions to buy used cars are at the lowest level in recent years," adds Mr. Eggert.

• **Competition**—He points out that competitive products and services are continuing to take a bigger bite out of the consumer's dollar. "In 1959, consumer expenditures for boats, airplanes, and other sporting goods were 40 per cent over the 1954-55 average. Airline travel was up over 60 per cent, while expenditures for new and used cars were up only 11 per cent."

• **Outlook** — Summing up those factors Mr. Eggert declares: "In our judgment the pros and cons just about cancel each other, which suggests that 1961 auto sales probably will be about the same as 1960's—some 6.7 million units, including 400,000 imported cars." He adds that while there's little likelihood of a further downturn in consumer buying attitudes, it is possible for such factors as increased defense spending and easier credit to build confidence so sales could go considerably higher. "We really won't know about that until sometime in the second quarter," says Mr. Eggert.

• **Long Range Forecast**—Looking farther ahead, he sees an expansion of the number of market segments for particular types and sizes of cars. He thinks each of the segments will be able to support at least two price classes of cars, possibly more. The station wagon group, for example, may evolve into a compact economy wagon and a more expensive luxury wagon. Each type will have specific style and functional and size characteristics to suit the needs of the different types of station wagon buyers.

He also suspects automakers have a reasonably adequate production capacity to meet present market needs. Changes in the next several years will be aimed more at improving equipment rather than adding to bricks and mortar, he says. The industry generally figures that Detroit's straight time production capacity will turn out about 8 million cars a year.

• **Sees Baby Bulge** — Explaining several of the often misunderstood factors that will affect car sales and economic growth, Mr. Eggert points to birth rates. Contrary to popular opinion, the biggest bulge in births (3.8 million) didn't occur until 1947. Those people won't be ready to enter the car market until 1965.

Even more important to automakers is the expected population increase in different age groups. Fastest growing group in the next ten years will be the 20 to 29 year olds who will push ahead 39 per cent to make up 31 million of the 219.5 million people expected to be living in the U. S. by 1970.

The "under 20" group will expand 37 per cent to 92.1 million. The number of 30 to 44 year olds will decline 3 per cent to 34.6 million and the 45 to 54 year old group will increase only 14 per cent. There will be 38.5 million people over 55, better than a 24 per cent increase from present levels. Says Mr. Eggert: "This is highly significant when you realize that all our marketing studies show that these older persons and the 20 to 29 year old group make up the bulk of the compact car market."

Disposable income is another reason why Mr. Eggert can forecast annual sales in the 8.6 million range by 1970. It's rising at a rate of 1.8 per cent a year. Measured in constant 1960 dollars, per capita disposable income should reach $2145 by 1965. He points out that new car sales are increasing at a 2.8 per cent annual rate while gross national product has been climbing at a rate of about 3.3 per cent.

(Mr. Eggert suggests eight steps for boosting marketing efficiency. For that story, see Page 75.)

U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
August	305,527	239,152
September	407,685	258,151
October	617,816,	507,527
10 Mo. Totals	5,574,983	4,844,252
November		254,527
December		494,931
Total		5,593,707

Week Ended	1960	1959
Oct. 22	146,339	112,488
Oct. 29	150,019	101,616
Nov. 5	145,537	63,451
Nov. 12	138,682	64,233
Nov. 19	150,579†	68,476
Nov. 26	110,000*	46,740

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

How Much Compacts Are Gaining

(% of total registrations)

1960	29.6
1958	10.5
1956	2.5

Source: R. L. Polk & Co.

More Families Own Two Cars

(% of car owning families)

1960	19.7
1958	16.1
1956	11.0

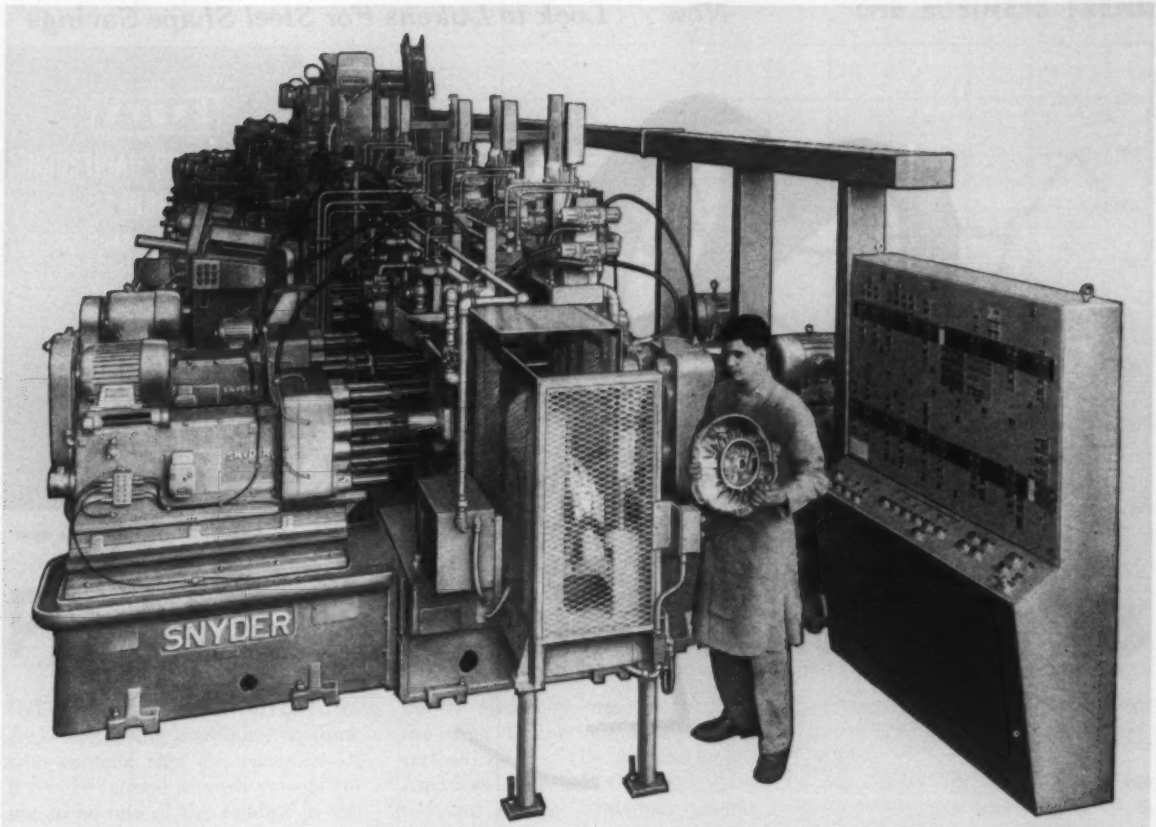
Source: University of Michigan Survey Research Center.

Today's Cars Last Longer

(Life in years)

1960	14
1950	11.7
1940	9.5

Trend line projection of average scrappage age from AMA data. Excludes wartime influence.



DIFFERENT SIZED PARTS INTERMIXED AT RANDOM ARE PROCESSED AUTOMATICALLY ON SNYDER SPECIAL 56-STATION TRANSFER

Here's another big Snyder special "building-block" transfer with a bit of extra versatility.

Specifications called for one sequence of operations on a big aluminum transmission cover case for domestic use and a different sequence on a smaller cover for export.

Schedules set a production rate of about four domestic units to one export unit but, for production convenience, the machine had to accept these parts intermixed at random and run them through automatically.

So, Snyder Engineering designed a "collar" which bolts to the smaller piece, bringing it up to locating and clamping dimensions of the larger piece. Lugs on the collar and workpiece control appropriate switches which by-pass certain operations. Parts are automatically positioned in process.

Operations include drilling, reaming, boring, tapping, chamfering, spotfacing, center holing, end milling, probing, air gaging, pressing in rectangular plug, pressing in bushing and a couple of washing operations.

Production is 150 parts an hour at 100% efficiency. Any of the 20 segments can easily be converted for comparable operations on other parts and the number of segments can be increased or reduced at any time. Your inquiries are invited.

SNYDER
CORPORATION
(Formerly Snyder Tool & Engineering Company)

3400 E. LAFAYETTE—DETROIT 7, MICHIGAN
Phone: LO 7-0123

Now . . . Look to Lukens For Steel Shape Savings

Looks like a steel freight savings of $1663.47

The owl-eyed steel shape pictured above is a 3½" gage shackle plate. It weighs 483 lbs. and was flame cut to special tolerances in one of Lukens' fabricating shops. A customer ordering 50 of these from—say—600 miles away would pay a freight charge of only $493.89 on the pieces.

However, if the same customer decided to flame cut the parts himself, 106,800 lbs. of 3½" gage steel plate stock would be required. Cost of shipment . . . $2157.36. Extra cost to the customer on freight alone . . . $1663.47. *Plus* . . . the expense of his equipment investment . . . the tie-up of his capital in plate stock . . . the cost of handling 75% scrap . . . the problem of shop spoilage.

Moral: Don't pay freight on scrap. Contact Lukens for Steel Plate Shapes Service . . . flame cutting, shearing, blanking, bending, pressing, welding—of carbon and alloy plate produced on our own rolling mills. Call or write Fabrication Building, Lukens Steel Company, Coatesville, Pennsylvania. Address Dept. B-110.

LUKENS STEEL COMPANY
B-110 Fabrication Building
Coatesville, Pa.

Please send me your free booklet on Steel Plates Shapes.

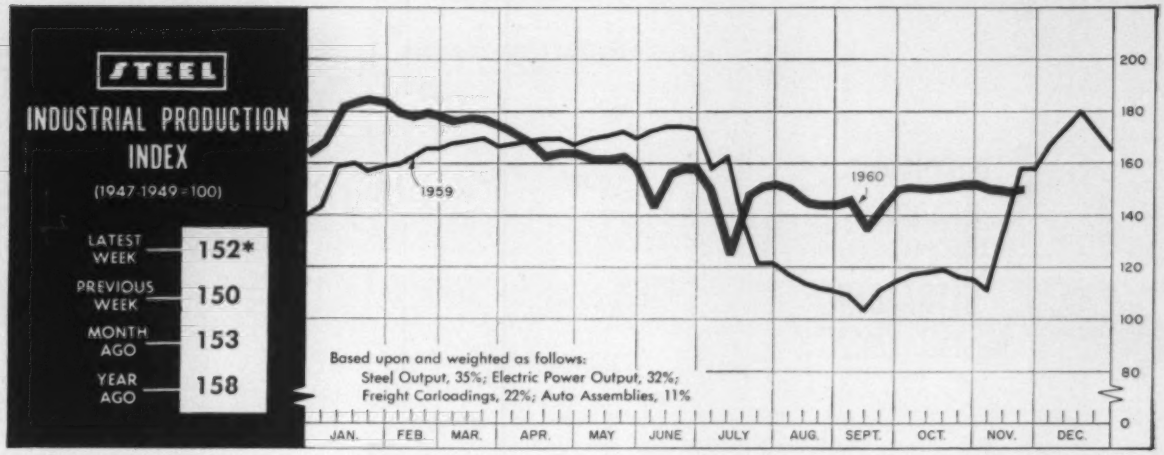
Name_____

Company_____ Title_____

Address_____

City_____ Zone____ State_____

LUKENS



*Week ended Nov. 19.

Production Firmness Raises Hopes

INDUSTRIAL PRODUCTION indexes are giving credibility to those who contend that the recession—if it can be labeled as such yet—is going to be one of the mildest in the postwar period. STEEL's trend line (above) has been remarkably strong in the face of some fairly serious declines, and the Federal Reserve Board's index of total production surprised many in October by holding at the September level instead of dropping another point or two.

• **Cars in Reverse**—Motordom can almost be likened to the knight in shining armor who came to the rescue just when everything seemed to be lost. Two weeks ago, it seemed inevitable that production of cars and trucks would be trimmed even farther than the 3.5 per cent cut (from the October level) announced for November. (November will have fewer production days.) In fact, output did drop from the October high point during the first two weeks of this month. But producers then got a shot in the arm from record sales in the first ten day selling period and jumped their schedules all the way up to 172,946 units in the week ended Nov. 19—the highest level since late May.

The pickup in motordom and the usual seasonal rise in the output of electricity more than offset the rapid decline in railroad freight carloadings. (The Association of American Railroads attributes it to tapering off in Christmas season shipping. Also, loadings of iron ore have practically come to a halt.) While steel production failed to add any strength to the latest index reading, at least it did not detract from the total as it has since mid-October.

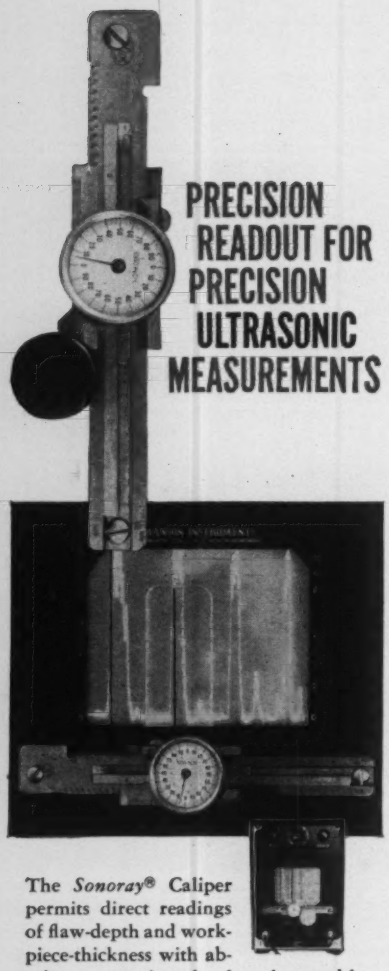
Net result: A gain of 2 points during the week ended Nov. 19 to 152 per cent of the 1947-49 base.

• **No Precedent** — There is no precedent in the history of STEEL's

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,352[1]	1,470	2,233
Electric Power Distributed (million kw-hr)	14,300[1]	14,111	13,812
Bituminous Coal Output (1000 tons)	7,375[1]	7,915	9,025
Crude Oil Production (daily avg—1000 bbl)	6,950[1]	6,955	6,935
Construction Volume (*ENR*—millions)	$473.6	$314.4	$372.1
Auto, Truck Output, U. S., Canada (*Ward's*)	180,653[1]	167,211	84,670
TRADE			
Freight Carloadings (1000 Cars)	555[1]	565	629
Intercity Truck Tonnage (changes from year ago)	−6.0%	+1.3%	+2.6%
Business Failures (Dun & Bradstreet)	298	317	285
Currency in Circulation (millions)[3]	$32,527	$32,298	$32,235
Dept. Store Sales (changes from year ago)[3]	−2%	−4%	+6%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$26,141	$24,170	$28,836
Federal Gross Debt (billions)	$290.1	$290.5	$290.5
Bond Volume, NYSE (millions)	$24.7	$22.4	$35.3
Stocks Sales, NYSE (thousands of shares)	13,969	13,743	17,136
Loans and Investments (billions)[4]	$106.7	$107.8	$104.3
U. S. Govt. Obligations Held (billions)[4]	$28.9	$29.3	$27.7
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	222.1	222.5	231.9
All Commodities[7]	119.6	119.4	118.9
Commodities Other than Farm & Foods[7]	127.9	127.9	128.6

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.



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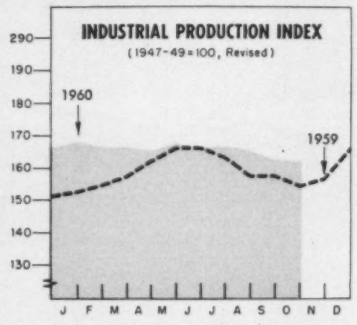
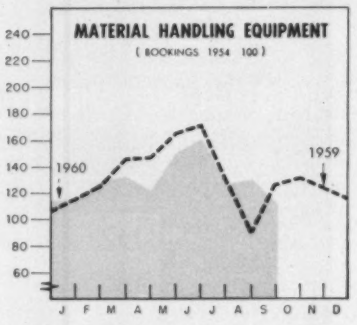




(Seasonally adjusted)

	Total Production		Total Mfg.		Durables Mfg.	
	1960	1959	1960	1959	1960	1959
Jan.	168	152	168	150	181	156
Feb.	166	155	166	153	178	160
Mar.	166	157	165	156	175	165
Apr.	165	162	164	161	172	170
May	167	166	166	165	174	177
June	166	166	165	166	171	178
July	166	163	165	163	172	171
Aug.	165	157	163	157	169	159
Sept.	162	157	161	156	166	157
Oct.	162*	154	160*	153	165*	155
Nov.	...	155	...	154	...	155
Dec.	...	165	...	164	...	174
Avg	...	159	...	158	...	164

Federal Reserve Board. *Preliminary.
Charts copyright, 1960, STEEL.

	1960	1959	1958	1957
Jan.	114.96	115.84	93.07	126.34
Feb.	128.74	124.77	93.49	139.29
Mar.	133.60	146.36	97.89	140.76
Apr.	122.41	147.28	122.36	132.67
May	150.33	164.45	118.04	157.95
June	160.23	170.72	131.15	121.57
July	126.79	130.26	134.34	128.31
Aug.	131.33	87.02	104.46	110.09
Sept.	111.11	126.43	85.41	116.79
Oct.	...	.....	131.09	111.35	124.80
Nov.	...	.....	124.16	110.88	87.80
Dec.	...	.....	113.78	105.97	105.65
Avg	...	.....	131.85	109.87	124.34

Material Handling Institute Inc.

industrial production index for what has taken place in the last two months. The trend line has been practically stable since the last week in September (variation of only 3 points). The auto industry remains the key element. If sales measure up to the pace indicated early this month, production will remain strong, and in turn, prevent steel production from dipping much lower than the current 47.5 per cent of capacity. But at the slightest sign of sales weakness, you can expect schedules to nose-dive because inventories of new cars in the dealers' hands remain at record levels.

In the meantime, you can look for the index to take its usual Thanksgiving holiday dip during the week ended Nov. 26. A 10 point drop is normal.

FRB Index Hesitates

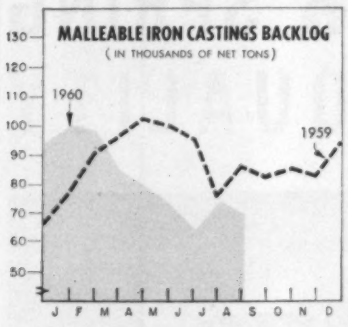
The fact that the FRB index remained at September's reading of 162 per cent of the 1947-49 average (see table and graph above) bolsters the contention of many that the economy is simply undergoing rolling adjustments that have failed to accumulate into full-fledged recession as in 1957-58. Declines in production of television sets, radios, appliances, industrial and commercial equipment, and several other products were offset by gains in autos, consumer staples, freight and passenger equipment, and farm machinery.

On the Board's new basis of 1957 equals 100, the index stood at 107 per cent, just 3 per cent under the average of the first half of the year.

Economists See Downtrend

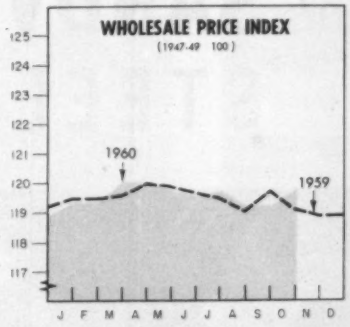
However, the consensus of a group of economists meeting in Cleveland last week was that the FRB index is due for a further decline, not only in this quarter but well into 1961. The median estimate for the fourth quarter was 105, which indicates a 2 point drop in both November and December. For the first quarter, the economists see a further slide to 103, with the bottom being reached in the second quarter at 102. The upturn will start in the third quarter, which could be anywhere between 103 and 106.

In chart form, the forecasts more closely resemble the saucer pattern of the 1953-54 cycle than the deep V-pattern of the 1957-58 trend. The drop from top to bottom would be



	Shipments		Unfilled Orders*	
	1960	1959	1960	1959
Jan. ...	83.2	73.2	100.3	77.3
Feb. ...	83.1	74.7	98.3	90.3
Mar. ...	86.2	84.3	84.7	95.8
Apr. ...	71.3	91.0	79.2	102.5
May ...	68.9	83.5	73.2	99.9
June ...	72.6	85.5	63.9	95.3
July ...	49.9	69.2	74.3	75.3
Aug. ...	58.8	65.1	69.9	85.9
Sept. ...	...	76.1	...	82.3
Oct. ...	...	75.5	...	85.0
Nov. ...	...	58.2	...	82.6
Dec. ...	...	80.1	...	93.9
Total ...	...	916.4		

*For sale. U. S. Bureau of the Census.



	All Commodities		Other Than Farm & Foods	
	1960	1959	1960	1959
Jan. ...	119.3	119.5	128.8	127.5
Feb. ...	119.3	119.5	128.7	127.8
Mar. ...	120.0	119.6	128.6	128.1
Apr. ...	120.0	120.0	128.7	128.3
May ...	119.7	119.9	128.2	128.4
June ...	119.5	119.7	128.2	128.2
July ...	119.7	119.5	128.2	128.4
Aug. ...	119.2	119.1	128.2	128.4
Sept. ..	119.2	119.7	127.9	128.5
Oct. ...	119.7	119.1	128.1	128.4
Nov. ...	....	118.9	....	128.5
Dec. ...	....	118.9	....	128.6

U. S. Bureau of Labor Statistics.

only 8 per cent, making it the mildest of the four postwar recessions.

Workweek Good Indicator

Do manufacturers have a sixth sense about which way the future trend of the economy is going to turn?

A study of the average hourly workweek for production workers over the last 13 years indicates they do. And if they haven't lost their touch, the economy is heading into a recession. Reason: The average workweek hit a post-steel strike peak of 40.6 hours in November, 1959, then trailed off steadily to 39.3 hours last April. A flurry of activity in May and June took it back up to 40 hours, but it dipped again until it reached 39.5 hours in September.

The 13 year record shows that the average workweek has dropped 7 to 11 months in advance of each of the recessions. It has gained in advance of two of the upturns by six months. Only in 1958 did this indicator fail to forecast the trend —both turned upward together.

There have been few false alarms in this leading indicator. In 1951, the average workweek dropped a little over an hour within seven months, but the FRB index of total production fluctuated only 2 points during the period. But at other times, even a slight adjustment in the number of hours worked was usually followed by a wiggle in the FRB trend line.

Analysts will have to await the November data to properly evaluate an upturn of 0.1 hour in October's workweek. If it continues, it could be an indication of a turnabout in the general economy sometime during the first half of 1961. However, as with all other lead indicators, this one should be used in conjunction with several others to confirm or refute an indicated future course of business.

Construction to Gain

Construction still looks like one of the bulwarks of the economy next year. Robinson Newcomb of Robinson Newcomb Associates told a Pittsburgh meeting of the National Industrial Conference Board that expenditures will jump about 4 per cent to around $57.5 billion next year. Public outlays will be $40 billion compared with about $39 billion this year. Private spending will total $17.5 billion compared with $16.5 billion in '60.

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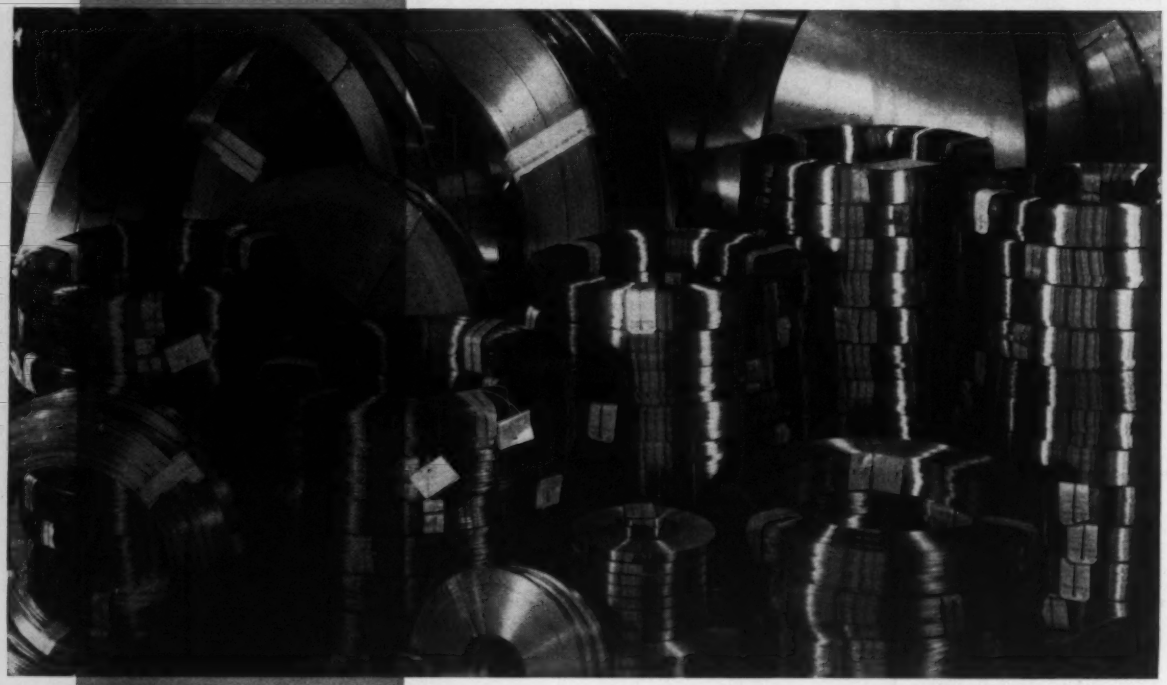

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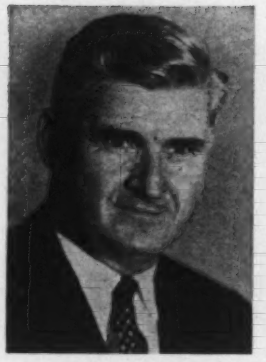
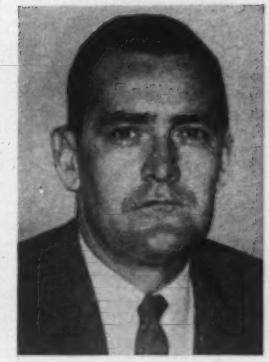


RONALD MacKAY
Anchor Mfg. president



JACK T. Le BEAU
Besly-Welles v.p.

EMIL F. PESLAR
American-Standard v. p.

CLYDE A. FORD
Convair mgr.-material

Ronald MacKay, executive vice president and chief executive officer of **Anchor Mfg. Co.,** Manchester, N. H., for the last year, was appointed president. **F. E. Davis** resigned as president to assume new duties as vice president and co-ordinator of new products research. **Robert L. Titus,** sales manager, was made vice president-sales. Anchor is a division of Basic Products Corp.

Jack T. Le Beau was elected vice president in charge of the Abrasives Div. of **Besly-Welles Corp.,** South Beloit, Ill. He replaces **Norman C. Minehart,** retired.

Philip H. Kirby was appointed director of metallurgy for **Anaconda American Brass Co.,** Waterbury, Conn. He succeeds **Ralph Nevers,** retired. **Horace F. Silliman** was named laboratory manager.

John R. Dunlap was made manager, Alloy Sales Dept., **E. J. Lavino & Co.,** Philadelphia.

Carl A. Ten-Hoopen Sr. and **Robert W. Bauer** were made assistants to manager of Manufacturers Product Sales Div., **American Steel & Wire Div.,** Cleveland, U. S. Steel Corp.

Dr. Carl A. Gerstacker, vice president and chairman of the finance committee of **Dow Chemical Co.,** Midland, Mich., succeeds **Dr. Earl W. Bennett** who resigns as chairman. **Herbert D. Doan** was made executive vice president to succeed the late **Dr. Mark E. Putnam. John M. Henske** succeeds Mr. Doan as manager of the Chemicals Dept.

Emil F. Peslar was appointed vice president-manufacturing, **American-Standard Industrial Div.,** Detroit, American Radiator & Standard Sanitary Corp. He replaces **R. S. Reade,** resigned. Since 1958, he has been vice president and director of operations in charge of the York and Decatur Works of York Div., Borg-Warner Corp.

John W. Decker was named manager, Shear-Speed Chemical Products Div., **Michigan Tool Co.,** Detroit. He was acting manager.

John W. Holdeman was appointed vice president-engineering, **Warner Automotive Div.,** Auburn, Ind., Borg-Warner Corp. At present associate director, Automotive Dept., at Roy C. Ingersoll Research Center of Borg-Warner, he assumes his new duties Dec. 1.

General Steel Tank Co., Birmingham, appointed **Gary Dobbs** manager of procurement. He was purchasing agent, Alabama Div., Standard Oil Co. (Kentucky).

Sharon Steel Corp., Sharon, Pa., appointed **Frank W. Knecht Jr.** vice president in charge of the newly merged Public & Industrial Relations Dept. He was general manager of the Brainard Steel Div. in Warren, Ohio.

Clair Miller was made director of purchases, **Auto Specialties Mfg. Co.,** St. Joseph, Mich.

M. W. Reed retired as executive vice president, international and raw materials, **United States Steel Corp.**

Clyde A. Ford was appointed manager of material at General Dynamics Corp.'s **Convair Div.** plant at Ft. Worth, Tex. He succeeds **S. E. G. Hillman,** recently promoted and transferred to Convair general offices in San Diego, Calif.

Ralph L. Vaughn was made assistant general superintendent, technical services, at **Kaiser Steel Corp.'s** Fontana, Calif., plant. He is responsible for plant production planning; plant, industrial, and metallurgical engineering; and metallurgical and quality control.

Portus M. Wheeler was named vice president-general manager, **Indiana Steel Products Div.,** Indiana General Corp., Valparaiso, Ind., effective Dec. 5. He was vice president-sales.

Dr. George E. Barker was named vice president and director of research at **Van Straaten Chemical Co.,** Chicago. He has been director of the metal laboratories of Quaker Chemical Products Corp.

George F. Dappert was named general manager, **Isomet Corp.,** Palisades Park, N. J.

Joseph F. Clary was made vice president-sales, Railway Div., **Budd Co.,** Philadelphia.

Melpar Inc., Falls Church, Va., subsidiary of Westinghouse Air Brake Co., appointed **Charles B. Raybuck** vice president for contract management; **Dr. Paul E. Ritt** director of research; **Robert S. Butts** technical adviser to the executive vice presi-

NORMAN F. TISDALE JR.
Pitt. Metals Purifying post

RAYMOND O. OYLER
Bunting Brass v. p.

RICHARD N. CLOSE
Airborne Instruments div. dir.

ROBERT W. JOHNSON
Graver Tank v. p.

dent-general manager; **William C. Purple Jr.** vice president-engineering and manufacturing.

Norman F. Tisdale Jr. was appointed executive vice president, **Pittsburgh Metals Purifying Co.**, Mars, Pa., and **Woodrow D. East** was placed in charge of operations. Mr. Tisdale was president of Can-Am Metallurgical Sales Co., which he formed in 1957. Mr. East was with Englander Co. as manager, Houston plant.

A. P. Clarke was made manager, Standard Pipe Sales Dept., **Lone Star Steel Co.**, Dallas. **Joe S. Shepherd** succeeds Mr. Clarke as head of the Oil Country Goods Dept.

John W. Dowding, vice president-engineering, was named to head manufacturing operations at **Brubaker Tool Corp.**, Millersburg, Pa.

John D. Blitch was made assistant to the executive vice president of **Convair Div.**, San Diego, Calif., General Dynamics Corp.

Fred W. Dischinger was made Midwest regional sales manager, **Arwood Corp.**, New York. He was general manager and chief engineer for Yoder Morris Inc.

George Nobiletti joined **Astubeco Inc.**, New York, as manager of its Welding Fittings Dept. He served in a similar capacity with Astell Tubular Service Corp.

Joseph L. Tomaselli was made industrial engineer for the Electric-weld Tube Div. of **Jones & Laughlin Steel Corp.**, Oil City, Pa. He succeeds the late **J. E. Seibert.**

Raymond O. Oyler, director of sales, **Bunting Brass & Bronze Co.**, Toledo, Ohio, was elected vice president-sales. Prior to joining Bunting in 1958, he was general sales manager, New Departure Div., General Motors Corp.

Richard N. Close was made director, Apparatus Div., **Airborne Instruments Laboratory**, Deer Park, N. Y., division of Cutler-Hammer Inc.

Robert Poet was made general sales manager, Materials Div., Costa Mesa, Calif., **Narmco Industries Div.**, Telecomputing Corp.

Robert M. Donovan was made factory manager, Electronics & Instrumentation Div., Waltham, Mass., **Baldwin - Lima - Hamilton Corp.**

Eugene G. Hart, former vice president-marketing, was named president of **International Research & Development Corp.**, Worthington, Ohio, to succeed **George B. Moore.** Before joining International, he was Midwest district manager for H. H. Robertson Co., parent firm.

Andrew Lamberson was made product supervisor, Eastern zone, of the Quality Control Dept., **Colorado Fuel & Iron Corp.'s** Pueblo, N. Mex., plant. **Harold Newton** was made product supervisor, Colorado zone. **Ray A. Warfield Jr.** was made senior product supervisor, Pueblo plant.

Peter Lillys was made supervisor of **Crucible Steel Co. of America's** Syracuse, N. Y., research laboratory. He succeeds **Dr. A. Askoy**, transferred to Pittsburgh.

Robert W. Johnson was made vice president-marketing and sales for **Graver Tank & Mfg. Co.**, East Chicago, Ind., division of Union Tank Car Co. He was vice president-general sales manager at Dunbar Kapple Inc.

George N. Krassner was made product manager for astronautics equipment in the Electronics Div. of **Stromberg - Carlson,** Rochester, N. Y., division of General Dynamics Corp.

O. C. Teigen was named manager of the Racine, Wis., sales branch of **J. I. Case Co.** He replaces **H. B. Muske,** transferred to the new Twin Cities branch.

Karl E. Scott was elected president and chief executive officer, **Ford Motor Co. of Canada Ltd.** He succeeds **Rhys M. Sales,** now chairman. Mr. Scott was executive vice president.

Thompson Ramo Wooldridge Inc., Cleveland, formed two departments within staff industrial engineering and named **Arthur E. Stukey** manager of a new Standards Dept., and **Harley King** manager of manufacturing controls.

Joseph T. Owens was elected vice president of **Pittsburgh Plate Glass Co.**, Pittsburgh.

John O. Fighter was appointed to the International Div. office of **Cooper-Bessemer Corp.** in New York. He is replaced as branch manager of the Anaco, Venezuela, office by **W. R. Bohannan.**

Dr. R. H. McFee was made director of research, Azusa, Calif., plant,

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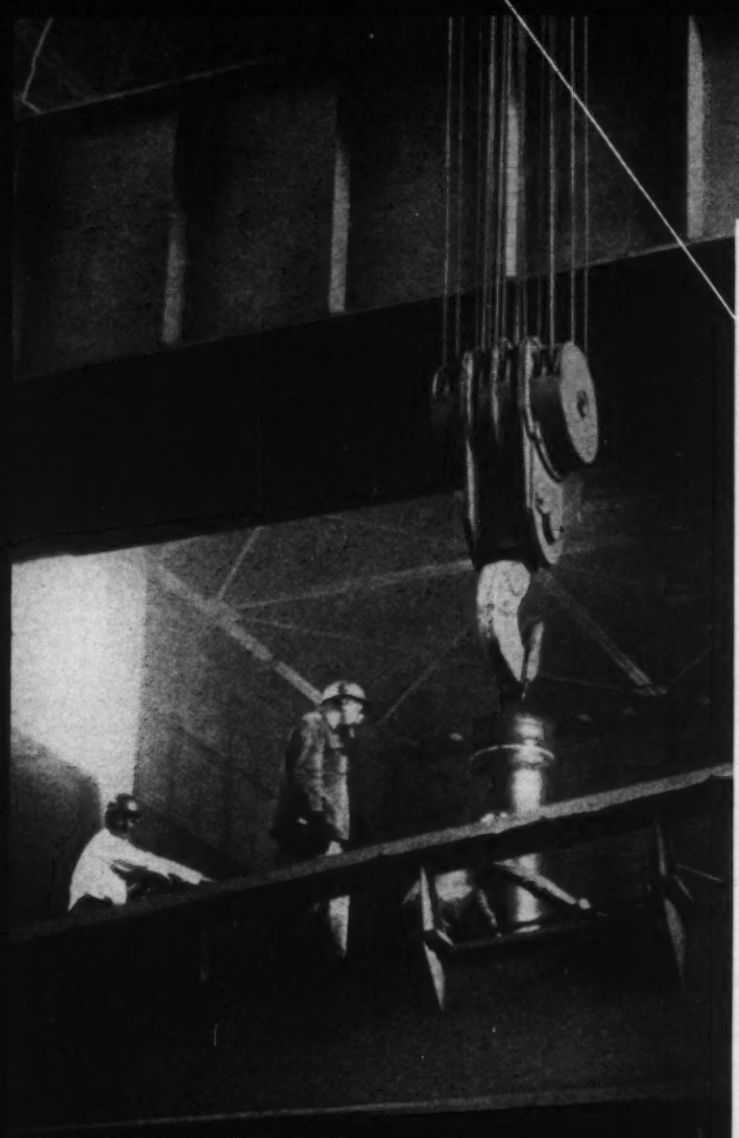

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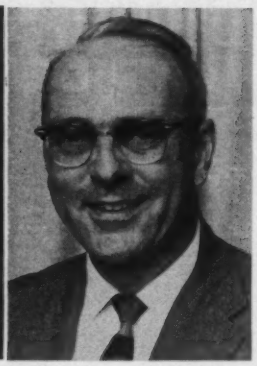
JOSEPH H. PROCTOR
Lukens market dev. mgr.

NORMAN B. OBBARD
U. S. Steel-Intern'l



WILLIAM J. McCLENAHAN
Sperry Electronic Tube post

HERBERT LAWRENCE JR.
Victoreen Instrument sales

LOUIS L. HARTMANN
Cooper Alloy Intern'l mgr.

HENRY C. JONES
Electrada president

Aerojet-General Corp., subsidiary of General Tire & Rubber Co.

Herbert Lawrence Jr. was made sales manager, nuclear spectrometry products, **Victoreen Instrument Co.**, Cleveland. He was regional field sales engineer, Marion Instrument Div., Minneapolis-Honeywell Regulator Co.

Clearing Div., Chicago, U. S. Industries Inc., appointed **John E. Bashforth** manager of its Axelson lathe line, Hamilton, Ohio, plant.

S. Ralph Shaffer was made general manager of **Curtiss-Wright Corp.'s** Metals Processing Div., Buffalo. He succeeds **Stanley B. Kurzina Jr.**, Curtiss vice president of manufacturing-engineering, who has been acting manager of the Buffalo Div. since resignation of **Vincent T. Gorguze** last July.

Ray J. Raupp was made chief engineer for **Bendix Filter Div.**, Bendix Corp., Madison Heights, Mich.

Louis L. Hartmann was made general manager, **Cooper Alloy International**, Fribourg, Switzerland, Cooper Alloy Corp.

Henry C. Jones, executive vice president and director of operations, **Electrada Corp.**, Los Angeles, was elected president to succeed **Homer H. Rhoads**, resigned.

Arthur D. Charboneau was appointed sales promotion manager for **Hydro-Line Mfg. Co.**, Rockford, Ill.

John V. Boardman was appointed works manager of the fully integrated General Savio steel plant of **Sociedad Mixta Siderurgia Argentina**, for which Armco International Corp. is supplying technical and operational advice.

James F. Donnelly, former manager of **Bridgeport Brass Co.'s** Tire Valve Div. in Bridgeport, Conn., was named general manager of the company's tire valve plant under construction in Lisburn, Ireland.

Joseph H. Proctor was appointed manager, Market Development Div., **Lukens Steel Co.**, Coatesville, Pa. He is succeeded as manager, Application Engineering Dept., by **John D. Heffernan.**

Norman B. Obbard was appointed executive vice president-international, **United States Steel Corp.**, Pittsburgh, effective Jan. 1. He is administrative vice president-production for the corporation.

William J. McClenahan was named marketing manager of **Sperry Rand Corp.'s** Sperry Electronic Tube Div. at Gainesville, Fla. He was sales manager.

Gerald E. Michael was named chief industrial engineer, **Valley Mould & Iron Co.**, Youngstown, to succeed **N. R. Clark Jr.**, recently named vice president-operations and industrial engineer. **Homer Beer** succeeds Mr. Michael as supervisor of industrial engineering, Hubbard, Ohio, plant.

Keuffel & Esser Co., Hoboken, N. J., appointed **William Drexler** product manager. **Thomas L. Mancuso** was made product manager, surveying products; **Elwood E. Parrish** director, international marketing; **Thomas F. McGovern** marketing manager, Keuffel & Esser of Canada Ltd.

H. R. Stitely resigned as president of **Lord Chemical Corp.**, York, Pa., subsidiary of Bell Intercontinental Corp. **James F. Connaughton**, president of Bell Intercontinental, succeeds Mr. Stitely. **Paul H. Setzler** was named vice president-general manager of the subsidiary.

Donald R. Butterfield joined **Idaho Maryland Industries Inc.**, Studio City, Calif., as vice president-marketing.

Les A. Thayer was elected vice president-sales, **Belden Mfg. Co.**, Chicago.

OBITUARIES...

Irvin E. Walton, 68, retired vice president - purchases and traffic, **Heppenstall Co.**, Pittsburgh, died Nov. 9.

Marshall Nay, 51, vice president, **Chain Link Fence Corp.**, Chicago, died Nov. 10.

Mr. S. E. Miller, Vice President and Division Manager of American Bosch Arma, shows the hundreds of items which go into the manufacture of a fuel injection pump (upper left of table).

IBM MOS

MANAGEMENT OPERATING SYSTEM SAVES AMERICAN BOSCH $120,000 YEARLY ON SHOP ORDERS ALONE

...TRIPLED SAVINGS ANTICIPATED WHEN SYSTEM IS EXPANDED!

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These additional savings are expected from methods now in use:

■ sharp reduction of machine setup costs. ■ standardized production levels, to minimize manpower fluctuations and concentrate inventory dollars on active sales items. ■ substantial time reduction in production schedule changes. ■ automation of annual standard cost revisions, with a 70% expense cut.

When the Management Operation System is extended to other areas, American Bosch estimates that savings will be tripled.

MOS can be applied to most industrial operations, with specially trained manufacturing representatives to assist you. IBM Balanced Data Processing provides comprehensive support in applying the system to your company's operation. For full information, call your nearest IBM office.

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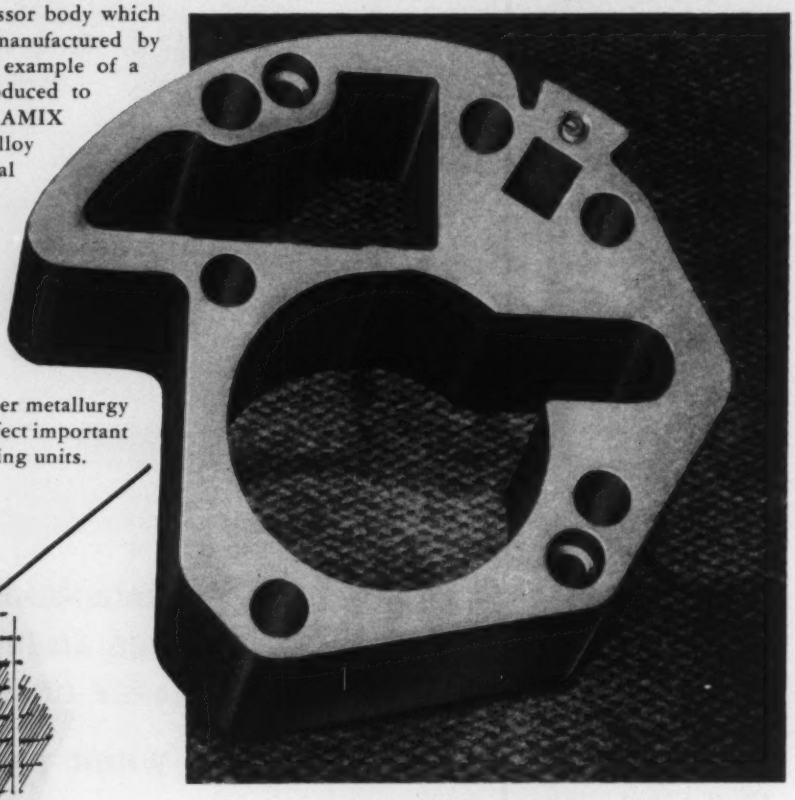
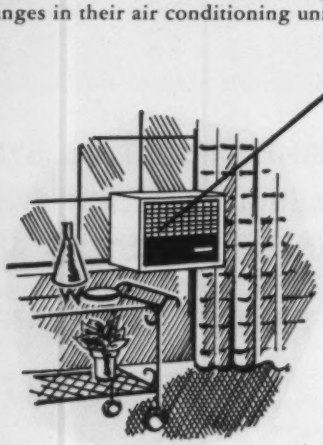
GRAMIX® COMPRESSOR BODY IS VITAL PART IN GENERAL ELECTRIC AIR CONDITIONER . . . this GRAMIX part is a new concept in powder metallurgy techniques . . . engineered to meet requirements of GENERAL ELECTRIC's new compressor design

This large, complex shaped compressor body which is employed in air conditioners manufactured by General Electric is an outstanding example of a GRAMIX part engineered and produced to exacting specifications. As in all GRAMIX products of powder metallurgy, the alloy was created to meet exacting physical properties required in this particular application. Correct briquetting, controlled sintering procedures, precise finishing operations and rigid quality control throughout the manufacturing process assures General Electric uniform, dependable GRAMIX parts. The production of this body as a product of powder metallurgy has also enabled General Electric to effect important design changes in their air conditioning units.





This part is shown full size. Actual weight: 2¼ lbs.

Write today for these helpful engineering manuals. Engineering Bulletin No. 18 covers design and metallurgical requirements and alloy selection of GRAMIX bearings. No. 19 contains facts about GRAMIX Machine Parts and No. 21 contains general information on GRAMIX products from Powder Metallurgy. Get your copies now.

X-274-1

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DIVISION OF THE WICKES CORPORATION, SAGINAW 18, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® POWDER METALLURGY • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

National Supply to Build Combination Pipe Mill

NATIONAL Supply Co., Pittsburgh, a subsidiary of Armco Steel Corp., Middletown, Ohio, has launched a multimillion dollar improvement program at its Ambridge, Pa., plant. It's part of Armco's $95 million construction program (STEEL, Oct. 17, p. 111) which includes major facilities at Ashland, Ky., and Houston.

A combination pipe mill will be installed at Ambridge that will make either continuous weld, steel pipe (½ in. to 4 in. OD) or electricweld pipe (½ in. to 7 in. OD) at a maximum speed of 2000 fpm. The mill can also be used to stretch reduce seamless pipe to smaller sizes.

• **New Products**—"The mill will produce high quality pipe at lower cost and give National Supply ability to meet increasing competition from both foreign and domestic producers," says Logan T. Johnston, president of Armco. The electricweld pipe and the smaller sizes of seamless pipe will be new products for the company.

With completion of the new mill within 18 months, National Supply will make all of its steel pipe and electrical conduit at the Ambridge plant. Previously, that plant specialized in making seamless tubular products. Welded pipe and conduit were made at the Etna, Pa., plant which will be closed.

• **Mill Components**—The new mill at Ambridge will combine a nine stand, forming and electric welding mill; an eight stand, welding, and reducing mill; a 20 stand stretch reducing mill; and a three stand, sizing mill. Furnaces and other equipment are included in the project.

Facilities will include a new, automatic, hot dip galvanizing line and all the necessary finishing equipment for producing rigid steel conduit and electrical metallic tubing. A new plating line will be provided for electroplating electrical metallic tubing and for electroplating the threads on rigid conduit.

The mill, auxiliary equipment, and warehouses for skelp, pipe, and conduit will be housed in buildings to be erected. Containing more than 500,000 sq ft of floor space, the buildings will increase the plant's manufacturing area by more than 50 per cent.

Aluminum Strip Line Added

A strip line for producing aluminum sheets for can stock is in operation at the McCook (Ill.) sheet and plate works of Reynolds Metals Co., Richmond, Va. The new line is supplementing Reynolds' major facilities for producing aluminum can sheets at Sheffield, Ala.

AIME to Honor Millsop

Thomas E. Millsop, president and chief executive officer, National Steel Corp., Pittsburgh, has been named by the American Institute of Mining, Metallurgical & Petroleum Engineers Inc., New York, as the recipient of its Benjamin F. Fairless Award for 1961. The honor is in recognition of Mr. Millsop's "accomplishments in behalf of the steel industry, for his support of continuing technical progress in the industry, and for his civic endeavors." Presentation will take place during the institute's annual meeting in St. Louis, Feb. 26-Mar. 2, 1961.

Improves Research Units

Harbison - Carborundum Corp., Falconer, N. Y., has enlarged its research facilities through the addition of an electric arc, melting furnace. Capable of developing pouring temperatures up to 4500° F, the unit can melt several hundred pounds of material at one time. It will be used as a research tool for melting a wide range of ceramic materials for heat and corrosion applications. The expansion also includes installation of an analytical x-ray laboratory, general chemical laboratory, and microscopes adapted to metallurgical and ceramic techniques in studying crystal growth. The company is jointly owned by Harbison-Walker Refractories Co., Pittsburgh, and Carborundum Co., Niagara Falls, N. Y.

Wheeling Steel Outlines Plans for Extensive Improvement of Facilities

WHEELING Steel Corp., Wheeling,, W. Va., is formulating an improvement program of "considerable magnitude" covering the next five years. The plan involves a new hot strip mill and auxiliary equipment to produce wider coils, a better quality product, and greater tonnage, says W. A. Steele, president.

"Immediate plans include the improvement of flat rolled products to meet increasing demands from customers for quality factors which will reduce their own costs," he explains. "Plans are being finalized looking toward the extension of our line of coated products, including light gage tin plate; additional, high finish, cold rolled strip capacity; expanded galvanized sheet production; and a greater penetration into the electrical sheet market."

Wheeling Steel spent $177 million during the 1950s for plant additions and improvements, with major attention to upgrading of facilities and equipment. Steel ingot capacity has been increased about 40 per cent since 1950.

The company's current projects which are nearing completion include:

• Increased capacity at Marquette Iron Mining Co. (in which Wheeling has an interest) which will more than double its shipments of high grade pellets.

• Development by Iron Ore Co. of Canada (in which Wheeling is a

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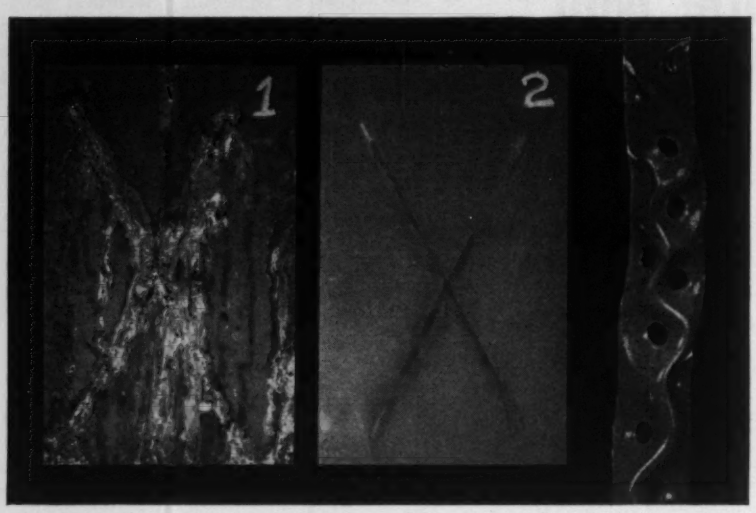

These two panels were identically painted, scored with an "X", and exposed to salt spray test for 480 hours. The difference: the one on the right was first treated with an Oakite CRYSCOAT iron phosphate conversion coating.

This painted tubing was Crys-Coated. Repeated punching did not break paint grip despite severe abuse and deformation.

Oakite CRYSCOAT® iron phosphate coatings cut the cost of corrosion-protection

You get proper protection *plus* economy with CrysCoat iron phosphate coatings.

First of all, they lock paint to steel, giving a superior paint grip under bending stresses. Bend tests show less chipping and flaking of paint. And note how paint held tight even at punched holes in the sample above.

Secondly, they keep corrosion from spreading at every scratch, as the panels above show so graphically.

But most important, they save money. Because CRYSCOAT iron phosphate processes *clean* as they phosphate. Because you need only a three-stage washer. Because *no* acid-proof equipment is required. You save both on equipment and production time. In addition, the smoother iron phosphate coatings soak up less paint than coarser phosphate coatings . . . giving you a sleek finish with one less coat.

It will pay you to *ask Oakite* about phosphating. You'll find the right one for *your* requirements in the complete CrysCoat line which includes both zinc and iron phosphate processes, for spray or tank, for room or elevated temperature operations. Meanwhile, write for Bulletin F-9475. Oakite Products, Inc., 26H Rector Street, New York 6, N. Y.

it PAYS to ask Oakite

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SCIENCE

over 50 *Est. 1909* *years' leadership in industrial cleaning*

partner) of new deposits in the area of Carol Lake. When complete, this project will materially upgrade Wheeling's receipts of iron ore from this source.

- Changing of bessemer converters at the Steubenville (Ohio) Works to an oxygen vapor steelmaking process.
- Introduction of combustion oxygen in the open hearth furnaces at the Steubenville Works through roof lancing.

Installs Annealing Units

Two more heat treating furnaces have been added to 31 pieces of equipment at Sargeant & Wilbur Heat Treating Corp.'s plant in Pawtucket, R. I. The larger of the two units has a capacity of 400 lb per hour. The gas fired, carburizing furnace is completely automatic. The unit can anneal all tool steels, cold rolled steels, and alloys, with the exception of high speed steel. A smaller unit has a capacity of about 250 lb per hour.

Electro-Tec to Expand

Electro-Tec Corp., South Hackensack, N. J., plans to construct a 30,000 sq ft plant in West Caldwell, N. J. It will more than double the company's research area, says G. J. Pandapas, president. The company manufactures slip rings, relays, and switches for industrial and military applications.

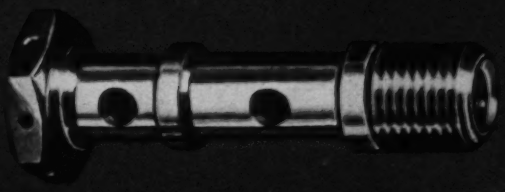
Interstate Steel Moves

Interstate Steel Co. is moving into its $1.1 million office and warehouse at 401 Touhy Ave., Des Plaines, Ill., and will complete the project by yearend. The warehouse contains 83,000 sq ft and enables the firm to handle up to 25,000 tons of steel, or more than double the former capacity.

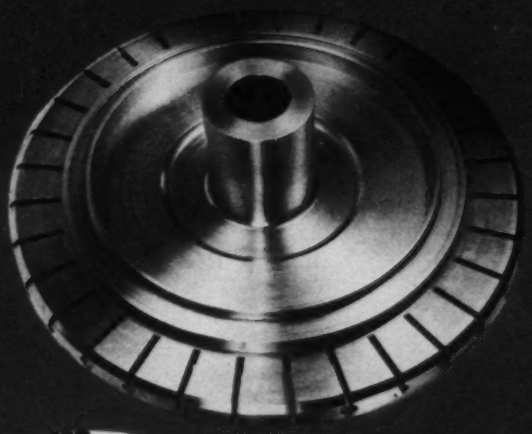
Enlarging York Plant

Allis-Chalmers Mfg. Co., Milwaukee, will increase the size of its York (Pa.) Works by more than 10 per cent. The project will add 36,000 sq ft of manufacturing area to the No. 2 plant, making a total of 255,000 sq ft. Completion is expected by early spring. A company official says the expansion is

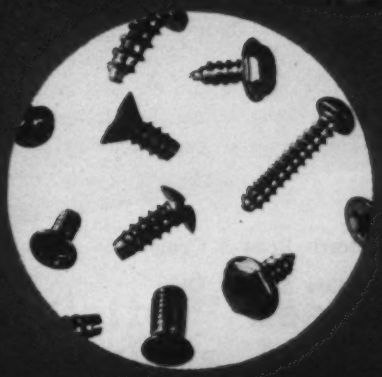
you can drill it...



you can machine it...



you can head it...



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...your first order will convince you—Carpenter Specialty Stainless is easier to fabricate. Made by one of the leading producers of stainless steels for industry, Carpenter Specialty Stainless assures greater output, fewer rejects and increased profits.

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Machining Bond on Castings

Here's the MBC plan: if you uncover a flaw while working on one of our castings, we pay your machining cost. This is in addition to replacing the casting without charge.

Our customers like the Machining Bond on Castings. It is one more assurance that it pays to buy high quality castings in the first place. Please write for our booklet on the Resources and Capabilities of:

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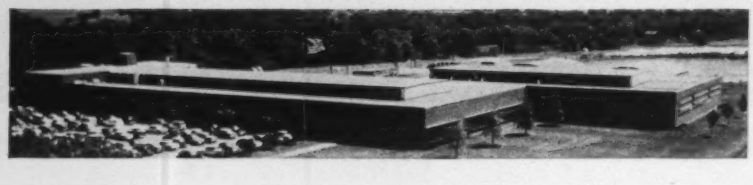


aluminum and ductile iron castings

BEAN

required to handle a large backlog of orders for hydraulic turbine equipment—it stands at a record $42 million.

Licenses English Firm

Racine Hydraulics & Machinery Inc., Racine, Wis., has licensed E. P. Allam & Co. Ltd., London, England, to manufacture and distribute the firm's soil compaction machinery. The Racine firm makes hydraulic equipment, metal cutting machines, railroad maintenance equipment, and construction tools.

Heil Acquires New Line

Heil Co. acquired the material handling equipment business of Ingersoll Kalamazoo (Mich.) Div., Borg-Warner Corp. Machinery for producing the equipment will be moved to Heil's main plant in Milwaukee where the operation will be included in its Body & Hoist Div.

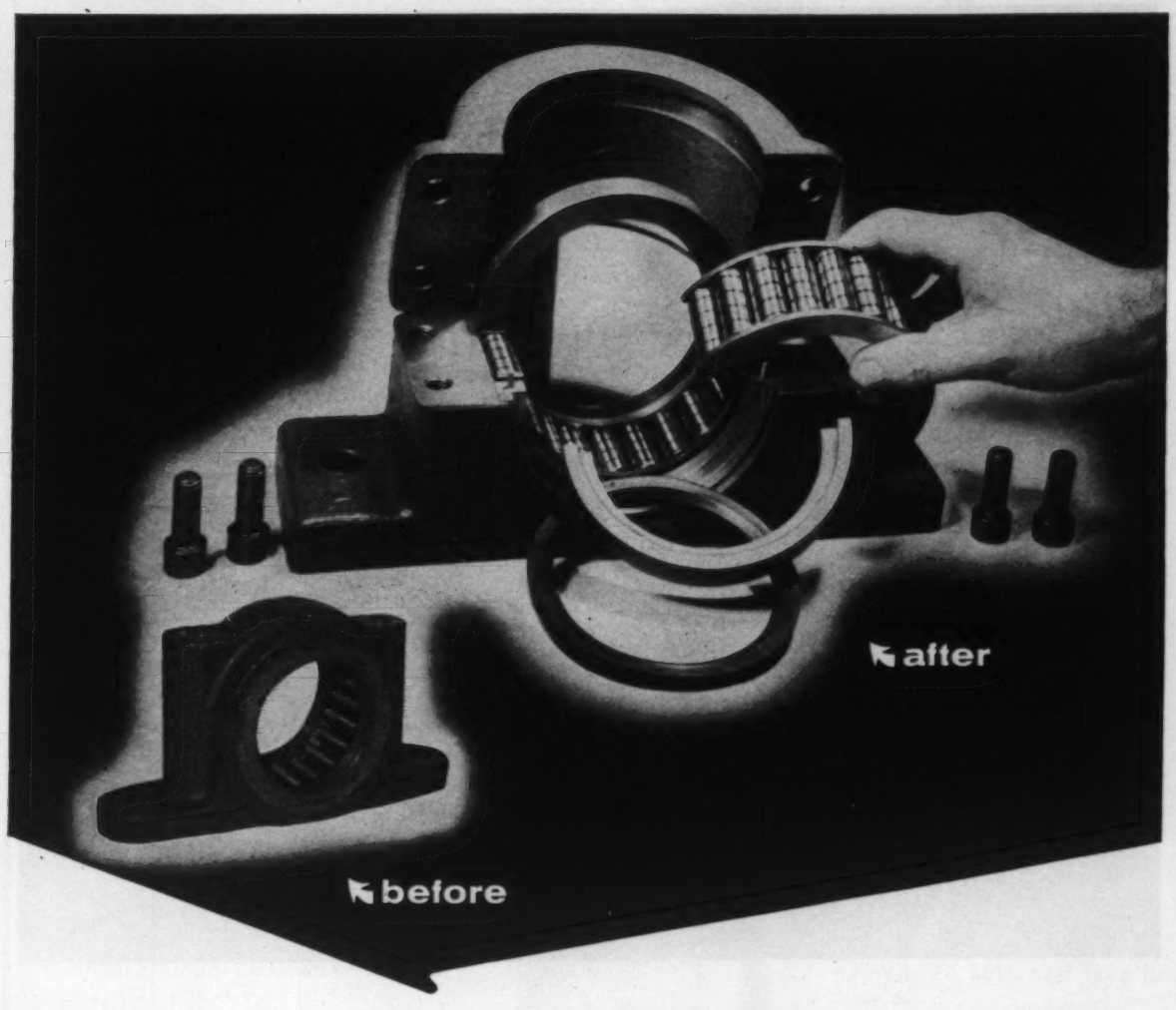
Forms Foreign Affiliate

Controls Co. of America, Schiller Park, Ill., has organized a foreign affiliate, Controls France, and will open a 27,000 sq ft plant at Schirmeck, France, early next year.

Thiokol Chemical Corp., Bristol, Pa., is constructing a $30 million plant at Tremonton, Utah, for production of the first stage Minuteman. Edward F. Nauman is general manager of Thiokol's Wastach Div. which will operate the plant for the Air Force. The plant is adjacent to Thiokol's Utah Div. where research and development on the Minuteman first stage have been accomplished.

Diamond Alkali Co., Cleveland, is constructing a multimillion dollar acetylene plant at Deer Park, Tex. The project is expected to be completed late in 1961.

Continental Screw Co., New Bedford, Mass., opened a warehouse on Washington Street, Richmond, Ind. Stocks of wood, machine, tapping, and thread cutting screws and



Here's a "before" and "after" bearing problem solved by Bearings, Inc.

A large steel mill customer has six cranes with bridge line shafts equipped with the solid housing pillow blocks shown in the "before" photograph. Whenever one of the line shaft bearings needed to be replaced, the entire section of shaft had to be removed. Maintenance costs and crane downtime were excessive and costly. Our engineers were asked for a solution.

THE PROBLEM: Due to the extremely low base to center of shaft dimension of the original bearing, a conventional split housing, split roller bearing pillow block could not be used.

THE ANSWER: We designed and furnished a special split housing pillow block (see "after" photo) incorporating split bearings and split seals which maintain the original dimensions. These can be installed or replaced on the crane in a fraction of the time formerly required just to dismantle the line shaft.

This is just one of many successful solutions of a tough bearing problem. We can help you solve your bearing problems and supply replacement bearings from the stock carrying branch near you. We're authorized distributors for all nationally known bearings. Call us!

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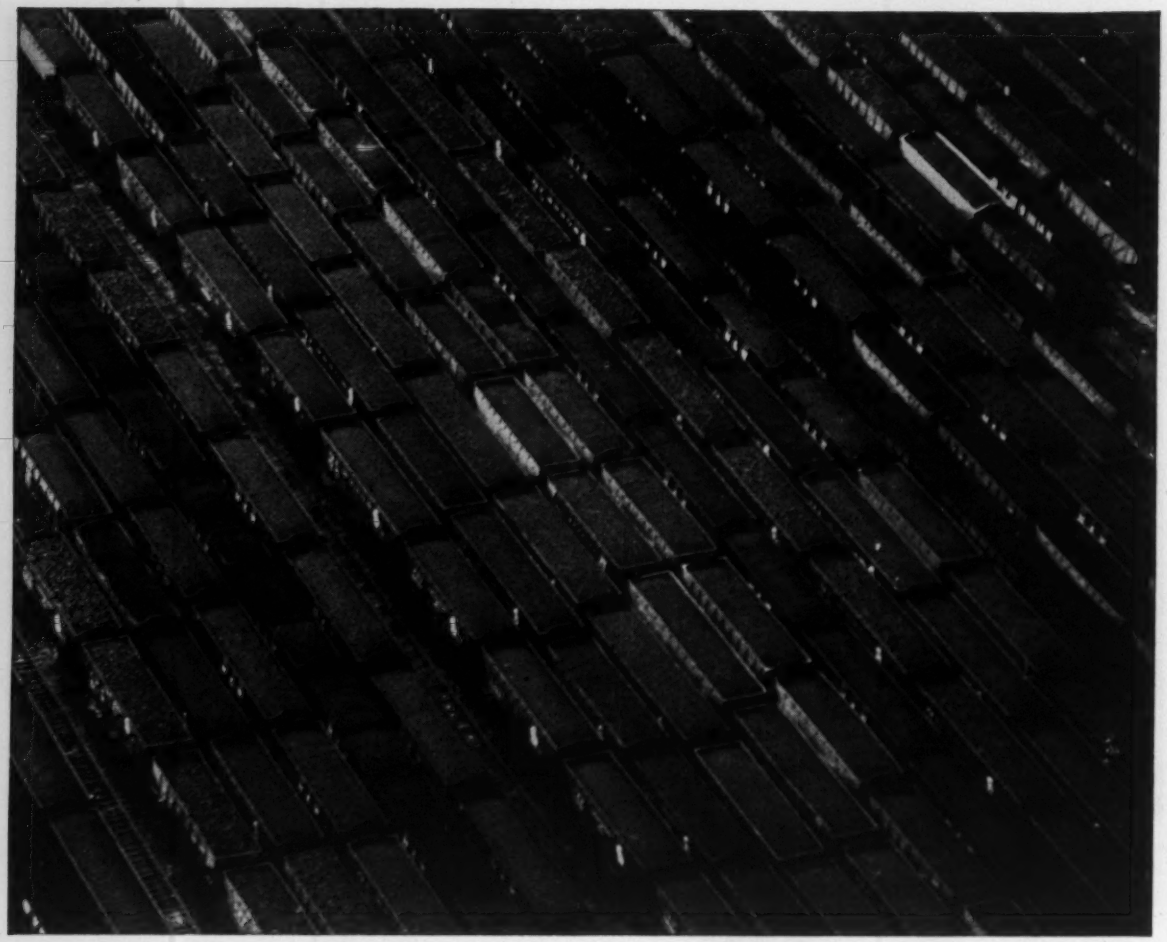
and

in the South → **DIXIE BEARINGS, INC.**

ARKANSAS: Little Rock • **FLORIDA:** Jacksonville • **GEORGIA:** Atlanta • **KENTUCKY:** Louisville • **LOUISIANA:** Baton Rouge New Orleans • **N. CAROLINA:** Charlotte • Greensboro • **S. CAROLINA:** Greenville • **TENNESSEE:** Chattanooga • Kingsport • Knoxville Memphis • Nashville • **VIRGINIA:** Norfolk • Richmond • Roanoke



How Island Creek helps Great Lakes Steel look to the future

Today more than ever, companies like Great Lakes Steel Corporation are taking a good long look ahead in all areas of their operation. And when they look at coal, they find they must ask some pointed questions of themselves and their suppliers: "Can we count on these suppliers to deliver adequate quantities of the coking coals we're going to need in the years ahead? Can we be sure of the uniform quality of these coals, year in and year out?"

As a major supplier of coking coals to Great Lakes Steel, Island Creek is proud to be able to give such satisfying answers to these questions. For Island Creek's vast reserves of inherently good metallurgical coals assure continuity of supply . . . far into the future . . . of coals low in sulphur, ash, moisture . . . coals of excellent coking characteristics.

We would welcome an opportunity to sit down with you for a good long look at your future. Write, wire or phone.

P.S. TO STEAM COAL BUYERS
An Island Creek Precisioneered Coal may help you lower your cost per 1000 pounds of steam.

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You can depend on Island Creek . . . a career company dedicated to coal

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many special products will be carried.

Diamond Chain Co. Inc., Indianapolis, opened a 7500 sq ft factory warehouse and sales office in Dallas. The firm is a subsidiary of American Steel Foundries, Chicago.

CONSOLIDATIONS

Hupp Corp., Cleveland, will purchase **Flour City Ornamental Iron Co.**, Minneapolis, subject to approval of Flour City stockholders. The Minneapolis firm fabricates architectural metalwork and produces aluminum and glass fiber pleasure boats.

Merger of **Bannock Steel Co.**, Pocatello, Idaho, and **Gate City Steel Inc.**, Boise, Idaho, is planned under the name of Bannock Steel Corp. Officers of Bannock Steel include: President, S. L. Cate Jr.; vice president, J. F. Julian; secretary-treasurer, A. E. Minton; vice president-contracting, W. H. Borton; and manager-steel sales, Ralph Tucker.

Allvac Metals Co., Monroe, N. C., is purchasing **Electro-Ceramics Co.**, Marietta, Ga., producer of ceramic magnets. The property will be moved to Monroe and will be operated as the Magnetic Materials Div. under Harry Smith, manager.

Rocker Solenoid Co., Wilmington, Calif., acquired **Carruthers & Fernandez Inc.**, Santa Monica, Calif. Rocker Solenoid is a partially owned subsidiary of Telecomputing Corp., Los Angeles. The acquisition provides an entrance into the field of complete solenoid actuated packages and valves.

Louis Allis Co., Milwaukee, purchased **Dynapar Corp.**, Skokie, Ill., producer of electronic equipment. James E. Everett will be manager of sales and engineering for Dynapar.

Missile Systems Corp., North Hollywood, Calif., acquired **DataMation Inc.**, Los Angeles. Missile Systems makes electronic assemblies and components for the missile and avionics industries. DataMation is

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use TOWNSEND tubular rivets and machines

The combination of Townsend tubular rivets and setting machines gives you a fast, economical assembly method for a variety of metals, plastics and fabrics. You will find that installed costs are lower than most other fasteners. Also the slight pressure required to install them prevents damage to soft and fragile material.

The Townsend Tubular Rivet Setting machines are versatile and can be tooled for almost any size and shape of work. They are available in floor and table models.

Townsend tubular rivets are available in steel, brass, copper, aluminum and other special materials. Quick delivery is assured by manufacturing facilities and stocks maintained in strategic locations throughout the United States. For information write to Engineered Fasteners Division, P.O. Box 71-C, Ellwood City, Pa.

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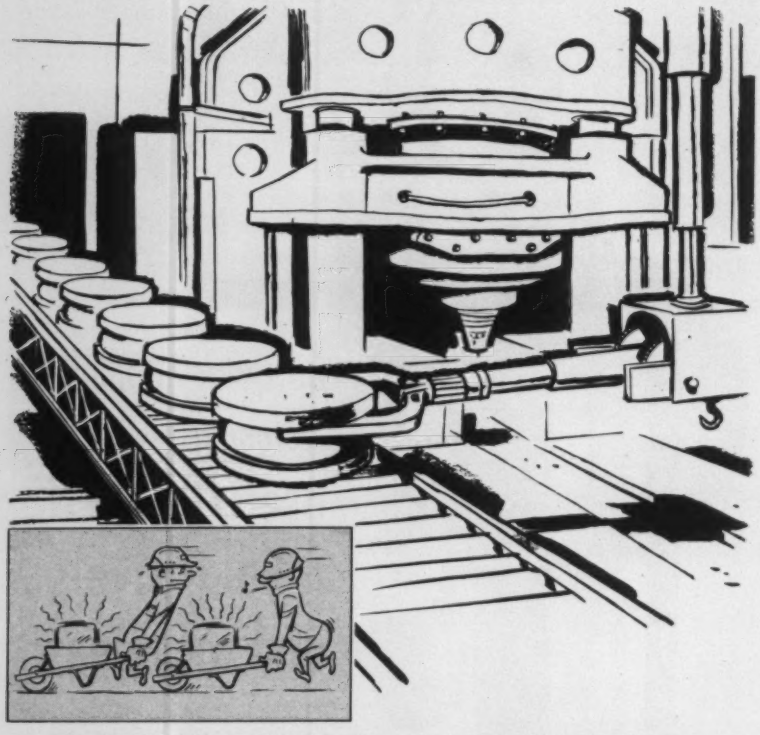
New twists in programmed manipulation from General Mills



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Many of industry's awkward handling problems are *still* being solved with relatively primitive manual techniques. You've heard the beefs! Moving heavy, bulky materials . . . hazardous environmental conditions . . . precise coordination—these are tough requisites for any materials-handling system.

Here's a way to free production workers of the drudgery, boredom and danger inherent in many industrial tasks . . . and save money too! General Mills electro-mechanical manipulators were developed for atomic installations requiring delicate handling in untenable radioactive areas. Our technical know-how and engineering experience suggest a number of industrial possibilities for solving your tough handling problem.

Coupled with a General Mills analog controller, the versatile Mechanical Arm can automatically play back extremely complex wrist-arm sequences . . . tirelessly, perpetually and without human error. Low cost recording medium permits automation of short run repetitive operations . . . with instruction changes made in minutes.

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NUCLEAR EQUIPMENT DEPARTMENT

General Mills **MECHANICAL ARMS**

First in Remote Handling

engaged in data reduction, processing, and documentation for Space Age industries.

ASSOCIATIONS

Fred H. Wetmore, Ryan Aeronautical Co., San Diego, Calif., has been appointed national executive secretary of the **Society of Aeronautical Weight Engineers Inc.**

Service Tools Institute, New York, re-elected T. A. McMullen, Bingham Herbrand Corp., Fremont, Ohio, president, and M. S. Bandoli, Pendleton Tool Industries Inc., Los Angeles, vice president.

Training & Research Institute, American Foundrymen's Society, Des Plaines, Ill., has commissioned the Franklin Institute, Philadelphia, to conduct original research in the field of heat transfer. Basic aim of the program will be to evaluate the heat flow from high temperature molten metals as it occurs during the casting process.

NEW ADDRESSES

Leeds & Northrup Co., Philadelphia, established its Chicago district office at 101 S. Washington St., Park Ridge, Ill. W. H. Neu is manager. The company makes automatic controls, precision measuring instruments, and heat treating furnaces.

General Dynamics Corp. moved its executive offices to 1 Rockefeller Plaza, New York 20, N. Y.

E. W. Bliss Co. moved its press sales headquarters from the general office in Canton, Ohio, to the firm's plant at Hastings, Mich.

Reynolds Aluminum Supply Co. moved into its branch office and warehouse at 3247 N. W. Yeon Ave., Portland, Oreg. The company is an affiliate of Reynolds Metals Co., Richmond, Va.

Art Metal Inc. will move its executive offices back to Jamestown, N. Y. The offices had been moved to New York early in 1959.

NEW HORIZONS IN LEAD

...The *Versatile* Metal

In new forms and in new combinations with other materials, the versatility of lead is being constantly developed. Today's designers are using lead's unique characteristics in an ever-widening range of application. Through modern research, today's industry **looks ahead with lead** in more ways than ever before. Here are some examples.
POWDERED LEAD • SPUN LEAD FIBRES • LEADED CLOTH AND WALL BOARD • *For Sound Attenuation.*
LEAD-ASBESTOS PADS • LEAD-PLASTICS COMPOUNDS • LEAD TAPE • *To Absorb Vibration.*
LEAD SHIELDING • SOLID LEAD AND LEAD BONDED TO OTHER METALS • LEADED GLASS • LEADED FABRIC— *For protection against X-Rays, Nuclear Radiation, and Corrosion.*
LEAD OXIDE • *For oil-less, ultra high-temperature bearings.*
TETRAETHYL AND TETRAMETHYL LEAD—*For better anti-knock gasoline.*
LEADED STEELS—*For easier machining.*
LEAD BASE PIGMENTS • LEADED PORCELAIN ENAMELS • PEARLESCENT LEAD PIGMENTS—*For Surface protection and decoration.*

PB-172

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Complete saturable reactor temperature control by Model 407 Capacitrols of wire enameling ovens saves time, bother and heat energy. The appearance of the coatings is improved and abrasion tests show consistently higher coating resistance.

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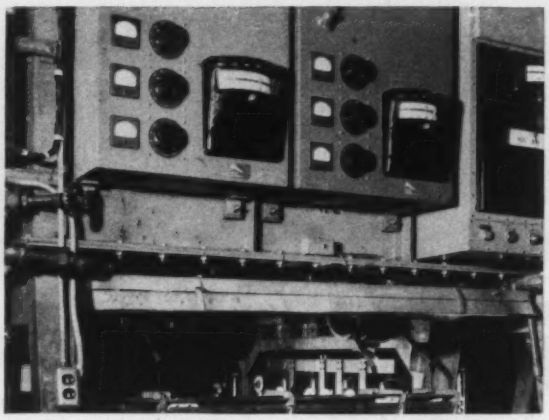

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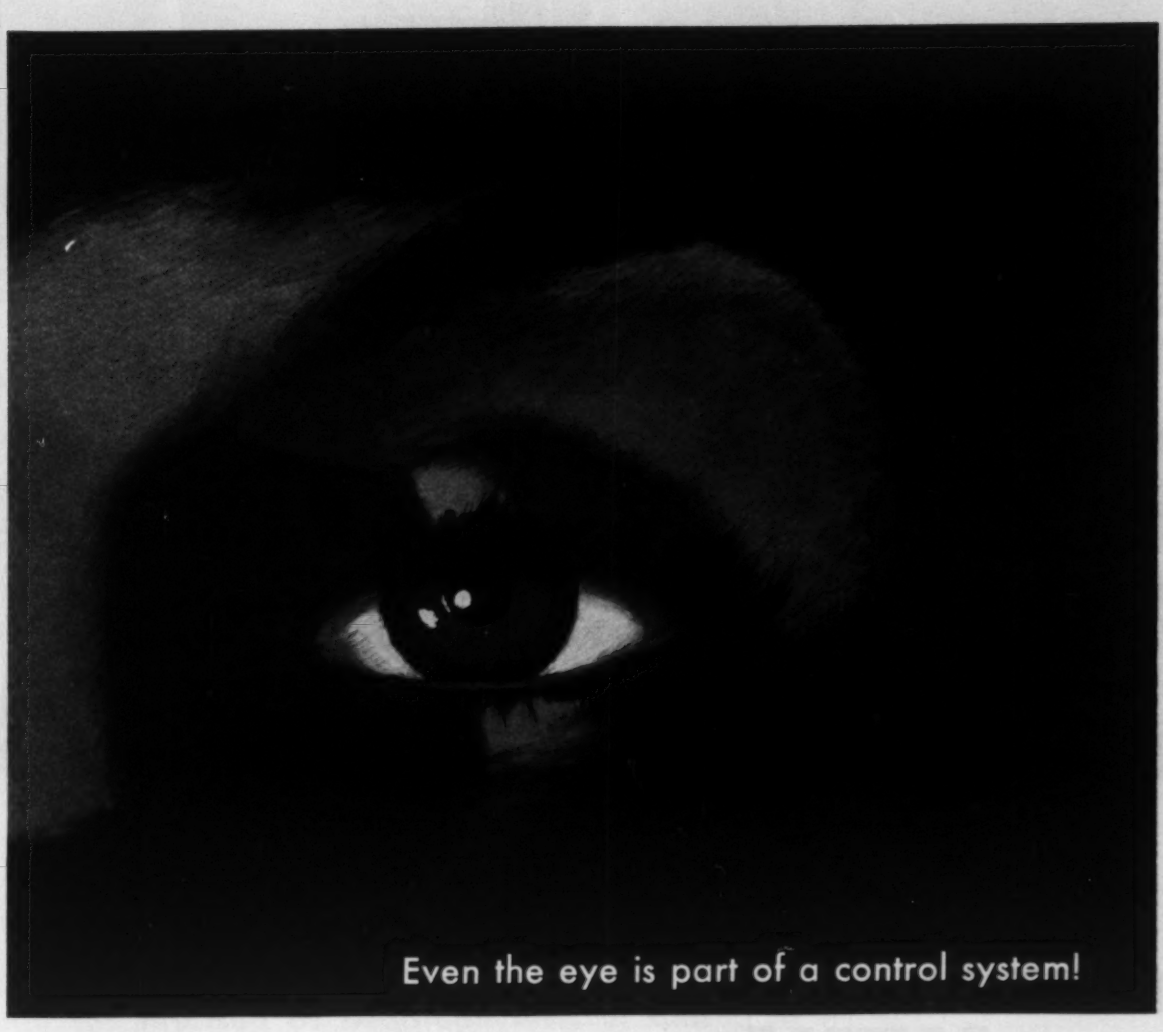

Process Control Systems

Wheelco sensing devices serve their control center just as the eye does. Light, heat, pressure, flow and other process variables are detected, measured, converted to self-regulating systems, and held within close limits by fine Wheelco instruments. Backed by twenty-five years of process control application, Barber-Colman can design a more profitable control system for your process. In the planning stage, call in a Barber-Colman, Wheelco Field Engineer to learn about the newest in instrumentation. His number is in the Yellow Pages.

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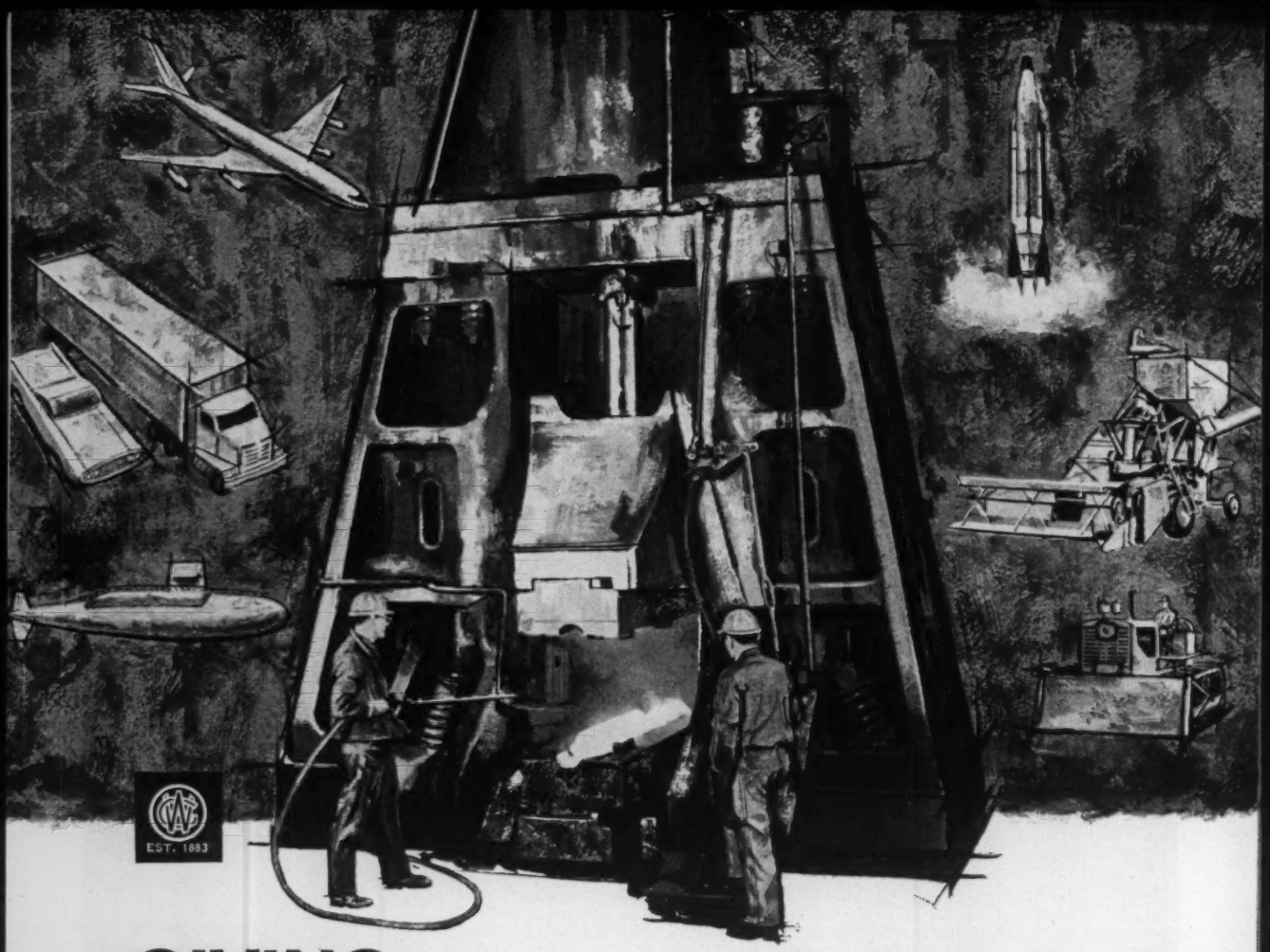

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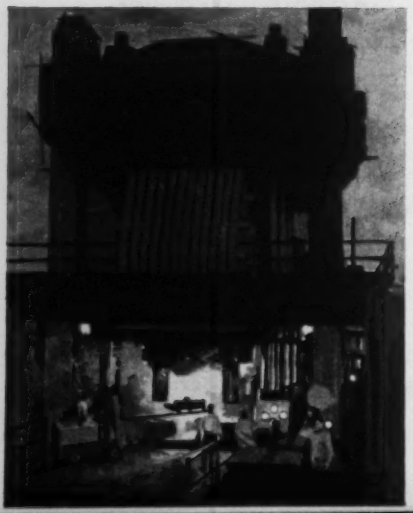
Specify "punishing service" in any environment—land, sea, air or space—and there is no substitute for a forging's endurance. Likewise, specify reliability in your supplier and there is no substitute for experience.

Here Wyman-Gordon has the outstanding record. Our background in hot working all forgeable materials covers more than three-quarters of a century. From it have come most of today's major advances—in forging techniques, metallurgical controls and development of facilities for extending size and complexity of forged parts. This accumulated know-how has done much to make Wyman-Gordon "forging headquarters" for an impressive list of industrial leaders.



Most likely our experience in saving weight, adding strength and reducing machining cost on countless other parts—can do as much for yours. To get expert appraisal, ask to have a forging engineer call while designs are still on the board.

WYMAN-GORDON

FORGINGS

of Aluminum Magnesium Steel Titanium . . . and Beryllium Molybdenum Columbium and other uncommon materials

HARVEY ILLINOIS WORCESTER MASSACHUSETTS DETROIT MICHIGAN
GRAFTON MASSACHUSETTS LOS ANGELES CALIFORNIA PALO ALTO CALIFORNIA FORT WORTH TEXAS

Technical Outlook

BRUSHING EXPANDS— Wire brushing capacity has been extended to metal cutting by a new, plastic bonded, wire wheel, claims Osborn Mfg. Co., Cleveland. The product fills a gap between straight, conventional wire brushing and the conventional grinding wheel. Some applications: Deflashing and removing sprue from aluminum and zinc diecastings, plastics, and other metals; fast removal of rubber or plastic overlays on metal substrates; brushing steel strip after mechanical shot blasting to improve finish.

ONE SHOT GEAR FINISHER— A German process permits hot forging of finished gears in a single crack. Teeth are said to be as precise as and stronger than cut gears. Die life: About 10,000 pieces. The process requires an upper and a lower die; gear teeth are outside the punch diameter. A preshaped blank is literally extruded into the lower die. Progressive flow is controlled by blank shape.

NABS MOVING HEAT— A new infrared detector can identify a hot object moving against a hot background. It gives engineers an added tool for control of parts moving in and out of furnaces, moving along an overheated runout table in a mill, or hot strip in an automatic rolling mill. The instrument is driftfree and insensitive to wide variations in temperatures found in furnace and mill areas, claims Electron Machine Corp., Umatilla, Fla.

IMPROVES PUMP RODS— An alloy called Triple H (chromium-nickel-molybdenum) increases strength, corrosion resistance, and hardness of polished rods employed in hydraulic pumps, claims Allegheny Ludlum Steel Corp., Pittsburgh. A test piece in an oil well has already lasted 3½ times longer than the best previous metal alloy.

EVALUATES VACUUM DIECASTING— "With present day, high injection pressures and velocities, the free air compressed into a diecasting may be greater than the volume of the die cavity. Vacuum diecasting is a way out because it eliminates casting variables, permits closer control. It is not a desperate remedy for high scrap rates . . . . but a logical step toward fully automated diecasting." Those are opinions of Hiram K. Barton, president, Hiram Barton Associates, Etchingham, England, which he expressed at the National Diecasting Exposition & Congress, Detroit.

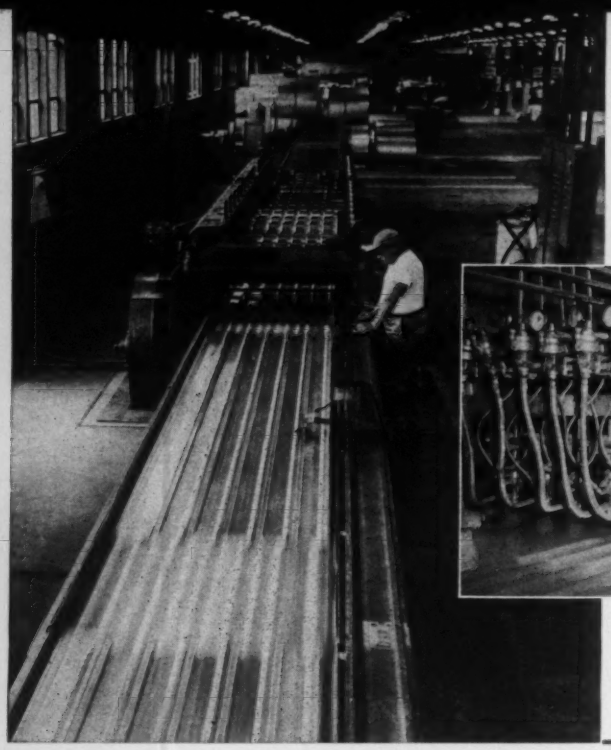
CHEAPER GAS SCRUBBER— Trends toward higher blast pressures have made it feasible to install a type of three-stage gas scrubber that is said to be as efficient as electrostatic precipitators, yet costs less, claim Russian sources. In one plant, gas passes through a conventional dust catcher and scrubber, then enters a vertical, venturi type atomizer which mixes streams of water with the gases. Semipurified gases pass through a final water nozzle system and sludge separator.

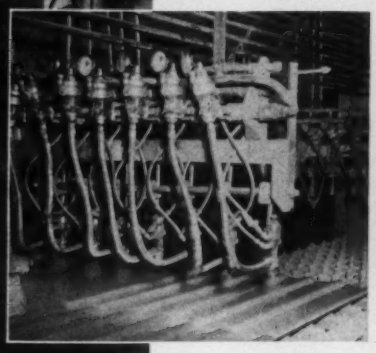
BETTER ELECTRODE?— The Russians are claiming that a new electrode they developed can weld 50 per cent faster with 30 per cent less power than former electrodes. (Formula: 8.7 quartz, 9 haematite, 8.15 ferromanganese, 1.35 starch, and 72.8 steel powder. Those ingredients are mixed with 22 to 25 per cent water glass with 1 per cent cellulose.) The mixture closely resembles AWS 6027. American experts' question: Are they ahead or just catching up?

BUILD A METAL HOME— An assembled, load bearing frame of aluminum is the heart of a new building system for one story structures. The system is the result of more than five years' work by Functional Structures Inc., a fabricator, and Reynolds Metals Co., Richmond, Va.

FLOWERY PROSPECTORS— Biogeochemists and geobotanists are the latest experts to prospect for minerals, says Arthur D. Little Inc., Cambridge, Mass. They look for variations in plant life over mineralized ground—the way they grow, or the species found. Since plants can concentrate some metals, an ash analysis can confirm the kind of mineral and the boundaries of the deposit. The experts start with aerial photos.

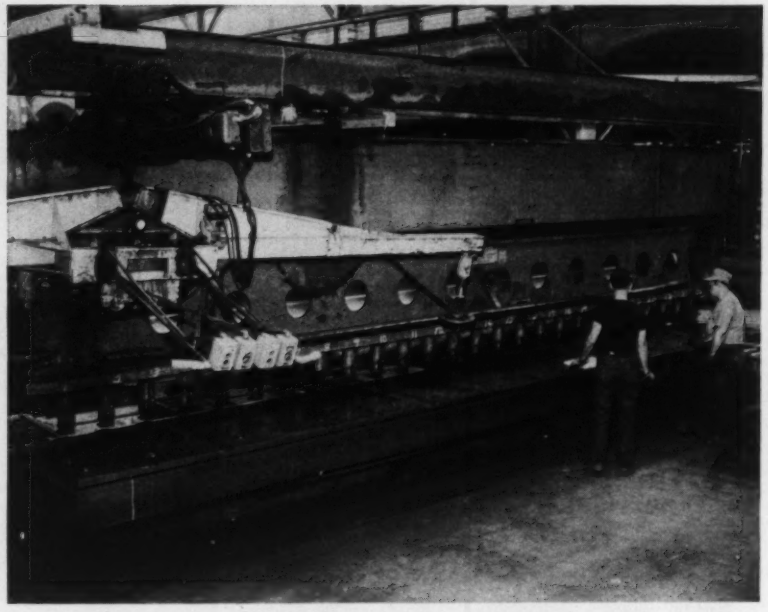
Auto Expert





Mass production methods make for faster fabrication and finishing of roof and wall panels. Galvanized steel strip is paid off an uncoiler through a roll forming unit (far left)

Experience in automobile production gave Hillery Knecht several ideas he thought worth trying on pre-engineered steel buildings. Here's how some of them are applied . . .



This big shear, which cuts steel plates 3/8 in. thick and 26 ft long, allows long span structural members to be made without splices, for greater strength

CONTINUOUS processing of coiled strip, use of automotive fabricating and finishing techniques, and interchangeability of parts can be combined to reduce the manufacturing costs of metal buildings and put more appeal into them.

That is the philosophy of Hillery G. Knecht, vice president-manufacturing, Stran-Steel Div., Terre Haute, Ind., National Steel Corp.

• **Coils are fed through roll forming stands, cut to length for wall and roofing panels, bond coated, and baked in a continuous operation.**

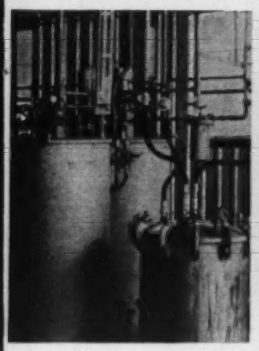
Galvanized steel or aluminum strip, in 10 ton coils, passes through a 15 stand, roll forming mill at about 95 ft a minute, coming out with a rib-type pattern. Coils entering the mill are 41½ in. wide; the forming operation narrows them to 38 in.

Stiff brushes remove any buildup of zinc flakes from the forming rolls; wire brushes clean particles from the strip after it is formed. The strand is then cut into panel lengths.

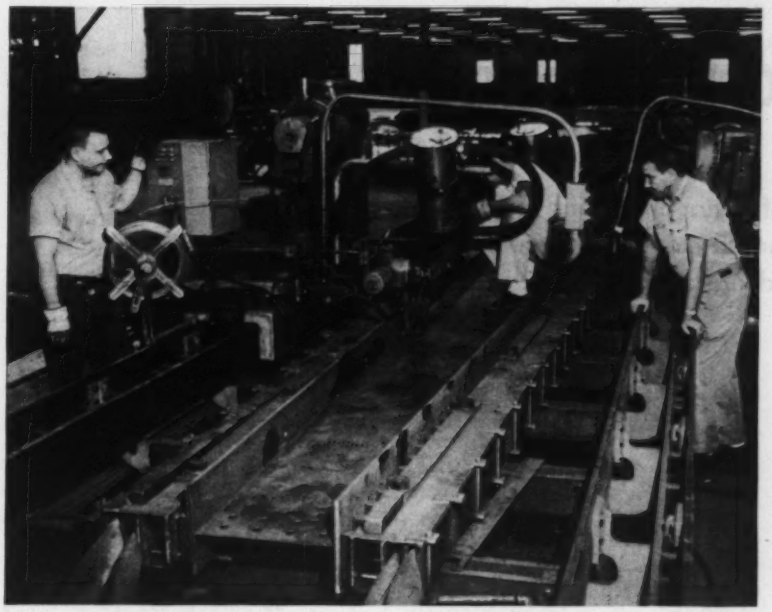
Ribbed sheets are run onto a conveyor traveling 105 ft a minute. They are bond coated by a bank of five spray guns; then they pass through a flash tunnel for solvent removal. A 20 ft, gas fired oven cures the panels at 300 to 350° F. Then they are air cooled.

• **Panels are painted by stationary and rotating banks of spray guns,**

Stresses Color on Steel Buildings



Bond coating is applied, then panels pass through spray booths (first small photo) for color application. Tanks contain nine standard colors that are circulated through booths from storage area. Distribution system is controlled from a central panel. Finished parts are packed for shipment (above)



Web of an H-beam is laid flat on a welding jig, and side plates are pressed into place with pressure fingers. Track mounted welders join the elements

then oven cured. Multiple paint pipes permit rapid color changes.

Panels travel through color coating processes on a conveyor that travels 80 ft a minute. They are air sprayed to remove foreign material and preheated. They move through a spray booth where fixed guns apply the required color, then through another booth, under an eight gun, rotating unit. Fixed and rotary spray units are operated with a memory timer that permits each gun to operate only when it is pointed at a panel.

After fume removal in a flash tunnel, the panels pass through a four zone drying oven, heated by gas convection burners and infrared tubes. Then they are water quenched and air cooled.

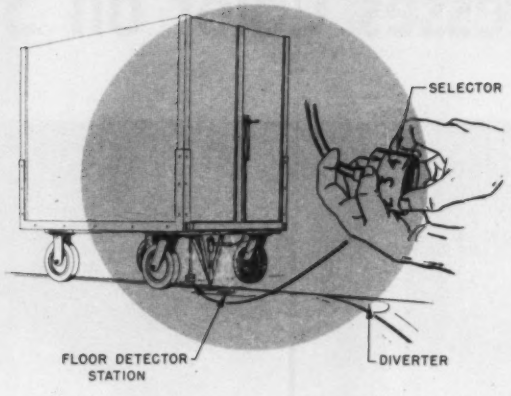
Nine standard colors are pumped from the paint storage and distribution building through a continuous circulating system. Colors are constantly mixed and kept at the right temperature for application. The line can be changed from one color to another in approximately 3 minutes.

• Close tolerances on structural members and window units insure interchangeability.

Plate fabricating equipment includes several shears (one cuts 3/8 in. plates up to 26 ft long for H-beams) and a number of roll forming units.

In the making of H-beams, the web is laid flat on the jig section of a large welding unit. Side plates are forced against the web by pressure fingers; track mounted, submerged arc equipment welds the elements to form the structural.

Decorative trim parts and windows designed for the buildings by Harley Earl, retired General Motors vice president-styling, will be finished on a line scheduled to be started up late this year. That will eliminate the need for painting at the building site.



Automatic switching can use purely mechanical means (left). But simplified electronic systems are practical for small warehouses (right)

Trends in Handling, Inventory Control

Expert discusses importance of data processing equipment in inventory control and automated methods of handling for warehousing and in-plant handling of parts

INVENTORY CONTROL and efficient material handling are the two most important factors in modern warehousing and the in-plant handling of parts, John Rumsey, chief engineer, Jervis B. Webb Co., Detroit, told the Westinghouse Material Handling Conference at Pittsburgh.

Material handling is one of the few remaining areas in which operational costs can be reduced by proper planning, maintains Mr. Rumsey.

One of the many types of efficient handling methods, he says, is the dragline conveyor with a powered chain running under the floor —it, in turn, drags four wheeled carts from one spot to another. Both manual and automatic methods are used to engage the carts in the power line below the floor. In the manual method, a pin is dropped into the conveyor slot to engage the pusher dog. When the cart is to be released, the pin is raised manually.

In the automatic systems, the pin is attached to a lever-action bumper bar. When pressure is applied to the bumper, the pin raises automatically; brakes are set on the rear truck wheels, and the truck is released from the conveyor pusher but remains in the slot for guiding. When the pressure is released, the pin drops back and engages the conveyor and the brakes are released.

• Automatic routing and switching have come to the floor dragline systems.

A system in use consists of four, main Towveyor loops with eight transfer lines, 13 spur lines, and an automatic weighing station.

When a cart is loaded, two selector dials on the truck are set for the proper in-plant destination. One dial has four positions and determines which main loop the cart will go to. The second dial has eight positions and selects the particular station or spur on the loop that the cart enters. The advantage of the automatic switching Towveyor is that the carts do not need to be manually disengaged from the line. They go to their destination and disengage themselves where they wait to be unloaded.

If a spur track is filled, the cart bypasses it and makes another trip around the loop. Carts are automatically transferred between loops, so a cart loaded at any point can be sent to any other point.

• All loops are connected to a master control panel.

If trouble develops in the system, the master panel indicates which of the four loops is involved, also which end of that loop.

The dispatching mechanism operates on energy absorption prin-

These carts, in a Johnson & Johnson Co. warehouse, have automatic pin releasing bumpers. Brakes are set when pin releases

ciples. The station control has an oscillator that is tuned to a specific frequency, and this power is fed into one part of a floor coil. Another part of the coil receives the energy and feeds it back to an amplifier section.

When a selector on a passing truck is tuned to the station frequency, energy is absorbed by it. The difference in energy remaining in the floor coil causes an amplifier section to operate a relay. Contacts on this relay can then be used for any control purpose the user may require.

Some advantages of using this type signal are cited by Mr. Rumsey: 1. No electrical or mechanical contact on the truck is needed. 2. Both pickup and oscillating coils are sealed and are impervious to moisture or other adverse atmospheric conditions. 3. Low powered radio frequency causes no interference with other equipment. 4. Control units may be mounted in or under floor plates at transfer stations, minimizing field wiring. 5. All stations can be pretuned before shipping and installation.

• Simpler setups may be adequate. One example: A unit designed to offer up to six selections. The operating principle is identical to that of the larger and more elaborate selectors, but simplicity of design greatly reduced its cost.

Another mechanism used for dispatching methods employs contact blocks on the floor which are resiliently mounted in vulcanized rubber. Standard wiper circuits are used.

One automatic dispatching system is strictly mechanical.

The cart contains two tow pins instead of the usual one. The power pin engages the line as in all other Towveyors. The second (guide) pin is next to the power pin. A mechanical counter is activated by a fifth wheel suspended under the cart about 1½ in. above the floor level. To dispatch the cart, the counter is set to a given number and the cart is engaged in the power line. As the cart moves along, the fifth wheel passes over small ridges in the floor located at each station or spur track. For every ridge it passes, the counter moves one digit until it arrives at the proper destination.

Upon reaching zero, the counter causes the power pin to be pulled up. The guide pin, which has been riding in the up position, drops down into another slot next to the towline. The momentum of the cart causes it to coast just far enough onto the spur line for gravity to take over, or the following cart will push it clear.

• Mr. Rumsey said almost all major warehouses under consideration today include plans for some type of electronic, data processing equipment to improve inventory control and order processing.

He cited a large automotive part warehouse that has electronic data machines capable of processing information at speeds up to 15,000 characters a second. They keep track of the inventory and distribution of more than 57,000 different parts for cars and trucks dating back to 1935.

In its first year of operation the new facility processed more than 750,000 orders for parts.

Hardness Test Shows Decarburization

Nondestructive method uses standard hardness tester. Variations in equipment are compensated for, and depths to 0.018 in. can be measured by procedure developed by a division of Boeing Airplane Co.

DECARBURIZATION of steel can be measured with a nondestructive test developed by the Wichita (Kans.) Div. of Boeing Airplane Co. A standard Rockwell hardness tester is used.

By contrast, microhardness traverse methods are destructive—the part must be cut to provide a cross section. The tests are reliable and reproducible, but metallographic preparation of the sample is time consuming, and a trained technician is needed.

The new procedure requires an operator qualified to use a hardness tester, but it shows far less variation than visual methods of estimating decarburization.

• Hardness measurements with the Boeing method give an indication of surface and core hardnesses; the depth of the decarburized layer is read from a nomogram. Range of the method is 0.000 to 0.018 in.; the standard deviation of six different testers on eight samples was 0.002 in., which equals the accuracy of microhardness measurements.

The division's quality control laboratory previously worked out a similar method, but it required a new nomogram for each hardness tester. As the machine was adjusted due to wear or misuse, or if minor load conditions changed, a new nomogram was also needed. So the method was made more useful by changes which permit use of Rockwell testers which are within a practical range of calibration.

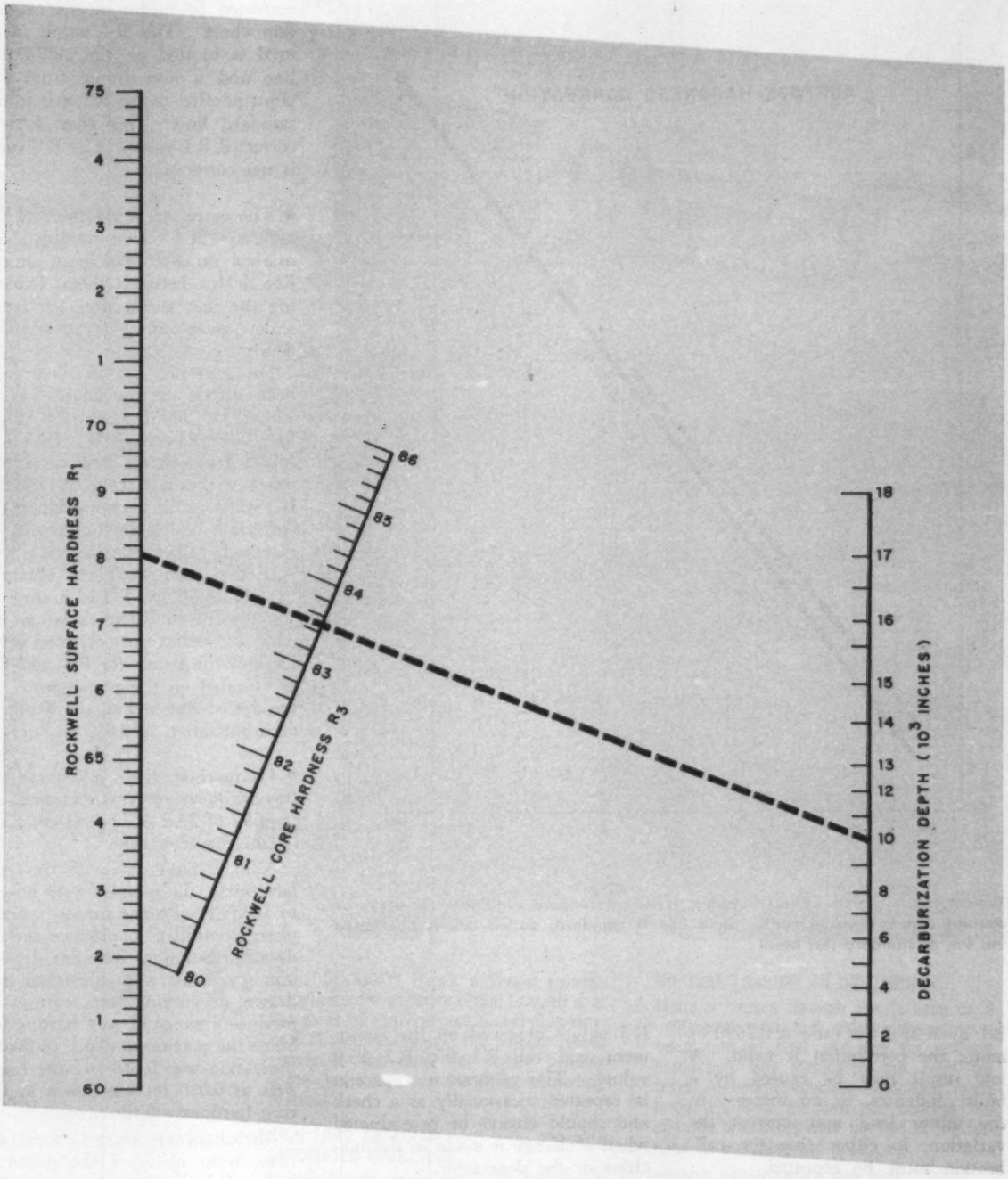
• Standard test blocks are used for checking the machine and setting up a correction chart.

To determine whether the hardness tester is within suitable tolerances, regular Rockwell test blocks are used—one about C25 in hardness, the other about C65. Measurements are made on each block —six determinations are made for each hardness level. If the last three tests on each block check the block's value to ±1.0 unit, the tester can be used for the evaluation of decarburization.

The chart for correction to standard conditions is first developed, using the C25 test block. A conventional Rockwell A hardness measurement is made, except that the major (60 kilogram) load is allowed to remain applied for 30 seconds, and the block is not removed or displaced afterwards. The dial is read to the nearest 0.1 unit, and the value is recorded as R 1.

Placing the second weight on the tester, the minor load is again applied and the zero adjusted. Tripping the release, the 100 kg load is applied for 30 seconds. The reading is not recorded, and the sample is kept in position, as before.

The final reading is taken with the 150 kg load. Again, the elevating screw is used to reapply the minor load, and the dial is returned



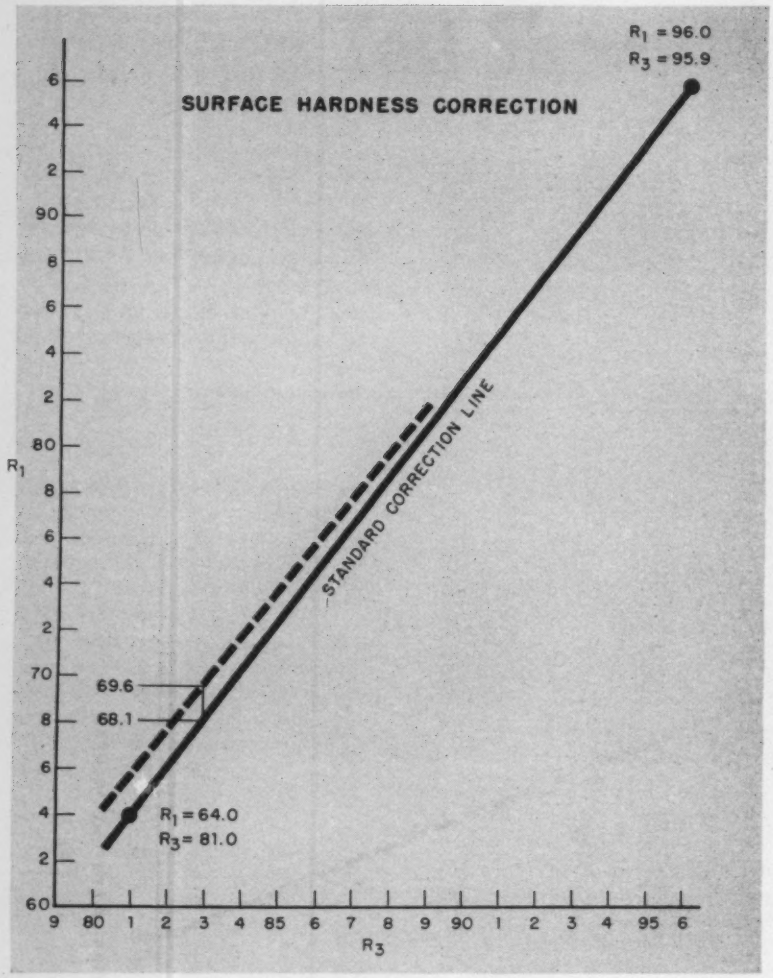
Nomogram is used to determine depth of decarburization from hardness tester measurements after correction is made for machine variables. Nondestructive method checks well with microhardness traverse procedure

to zero before applying the major load for 30 seconds. The reading, recorded as R 3, is made to 0.1 division.

• For calibration, six sets of readings are made. The spread in either range should be 0.3 or less; a second set of readings may be made if the range in the first is too wide.

If the values are outside the range, the cause may lie in the machine, the test block, or the operator technique. Vibrations should be minimized because a slight movement of the block will cause errors.

The R 1 and R 3 readings are averaged—again to the nearest 0.1 unit. A check on the validity of the test may be made by dividing



Typical chart used to correct hardness tester to standard conditions for depth of decarburization measurements. Solid line is standard; dotted line is developed via use of standard test block

R 1 by R 3; if the ratio is 0.7690 or more, the correlation is valid. A low result may be caused by a faulty indenter, or an increase in the minor load may correct the variation; in either case the calibration must be repeated.

• From the calibration readings, a correction graph is prepared.

Use of a large chart makes the reading of the corrections easier. Boeing uses graph paper about 10 by 15 in. (Keuffel & Esser Co. No. 358-6L). The standard line is drawn between R 1 64.0-R 3 81.0 and R 1 96.0-R 3 95.9 when the chart is prepared. The correction line is drawn between the point represented by the average R 1 and R 3 values observed on the equipment and the R 1 96.0-R 3 95.9 value. The calibration steps can be repeated occasionally as a check and should always be re-evaluated when a change is made in the machine or the penetrator.

• To measure decarburization, the calibration procedure is followed. Boeing recommends obtaining three sets of R 1 and R 3 values.

The R 1 and R 3 measurements are averaged if the maximum range is 0.6 or less; for larger ranges, an additional set of three measurements is suggested. With six sets of values, a range of 1.5 units can be allowed.

The average values measured are corrected by means of the calibration chart. The R 1 value measured is located on the calibration line and a line drawn from this point parallel to the R 1 axis to the standard line. This gives a new, corrected R 1 value. The R 3 value is not corrected.

• The corrected R 1 value and the average R 3 measurement are marked on the nomogram and a line drawn between them. Extending the line to the decarburization scale gives the decarburization depth.

For example, dotted lines have been drawn on the charts (Pages 119, 120). The R 1 and R 3 values for calibration were R 1 64.5 and R 3 80.4; the dotted line was drawn between this point and R 1 96.0—R 3 95.9. With some machines, the correction line might fall below the standard, rather than above.

If the average values obtained were R 1 69.6 and R 3 83.5, the corrected value for R 1 as shown would be 68.1. Using this corrected value for R 1, the points for R 1 and R 3 are located on the nomogram. As the dotted line shows, the depth of decarburization is 0.010 in.

• Comparison with microhardness traverse measurements was made on samples of SAE 4340 steel cut from a 3 in. diameter bar.

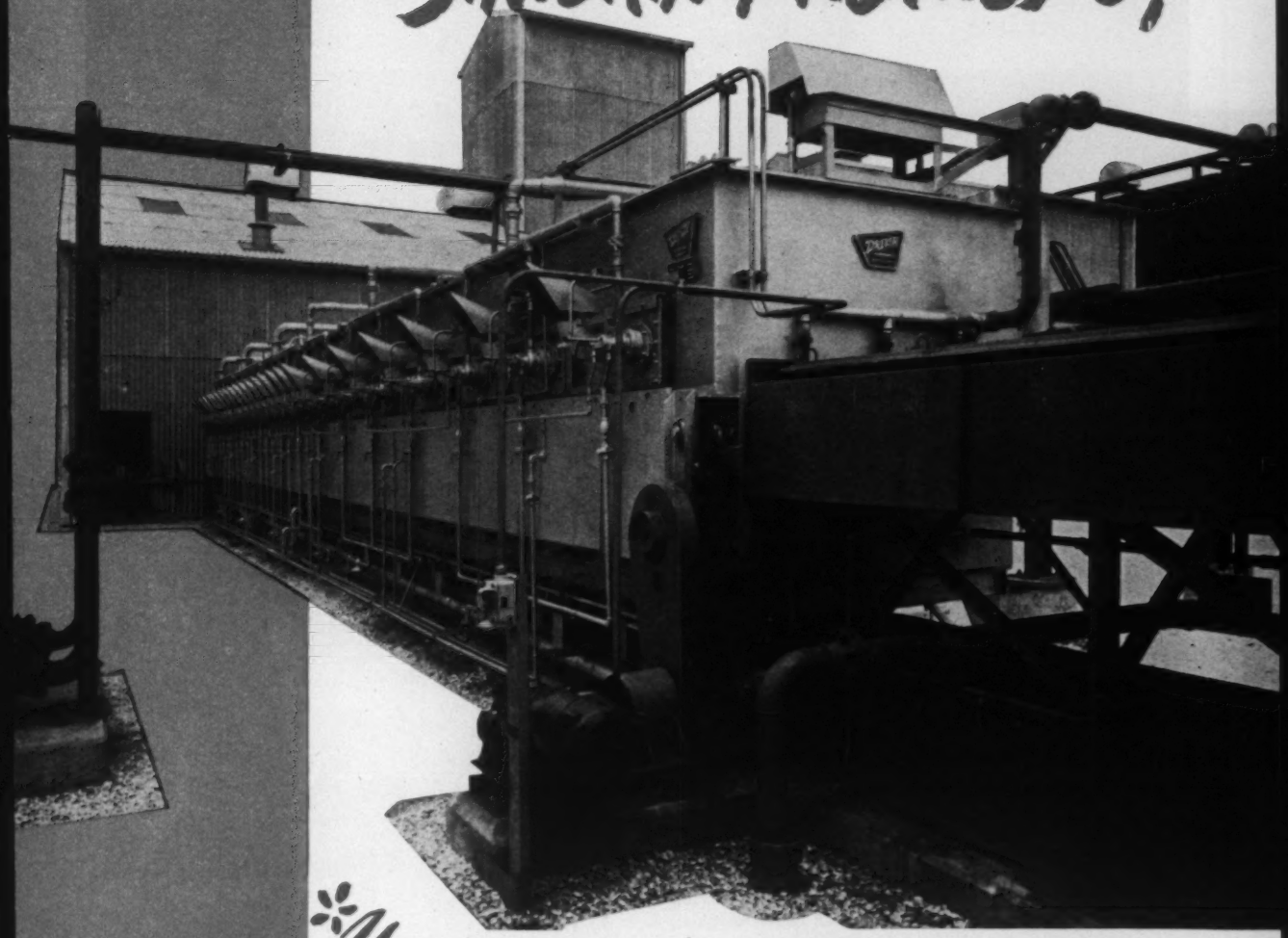
After grinding to a 25 rms surface finish, the samples were heated to 1625° F with the furnace atmosphere controlled to produce surface decarburization of different depths, and specimens were quenched and drawn at varying temperatures to produce a range of core hardnesses. Since the maximum depth of decarburization was 0.018 in., the hardness at 0.030 in. was taken as the core hardness of the specimens.

Microhardness traverse examinations were made of the mounted and polished cross sections. They were used to develop the nomogram. Tests showed good correlation between the two methods.

The division has 34 of the nondestructive test units in its heat treating and inspection departments.

• If you'd like to have a copy of this article, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.

SINTERING AL FRESCO!



YES, OUT-OF-DOORS! Here's a Drever Furnace installation for sintering nickel briquettes at the plant of the Freeport Nickel Company, Port Nickel, Louisiana. Its outdoor setup eliminates the need for costly building space—but this is only one of its interesting features.

HIGH LOAD CAPACITY—AUTOMATED OPERATION

Built to handle continuous in-line 8800# per hour production of sintered nickel briquettes, this Drever Furnace combines the high loading capacity of a roller hearth with the material handling convenience of a conveyor belt furnace. It is a radiant-tube, natural gas fired, roller hearth type furnace, gas tight for controlled atmosphere operation.

NO TRAY LOADING OR UNLOADING

Material passes through the furnace on a continuous mesh belt which allows greater circulation of heat and gas for uniform production and eliminates the need for trays. Automatic handling equipment loads briquettes onto the belt and conveys the sintered briquettes from the end of the furnace for weighing and packaging.

DREVER ENGINEERING FOR YOU

This unique out-of-doors installation is an example of Drever application of sound engineering principles, and experience in the field of furnace design. Our engineering staff is available for consultation concerning your requirement—write or phone us. Drever Company, Bethayres, Pa. Phone: Wilson 7-3400.

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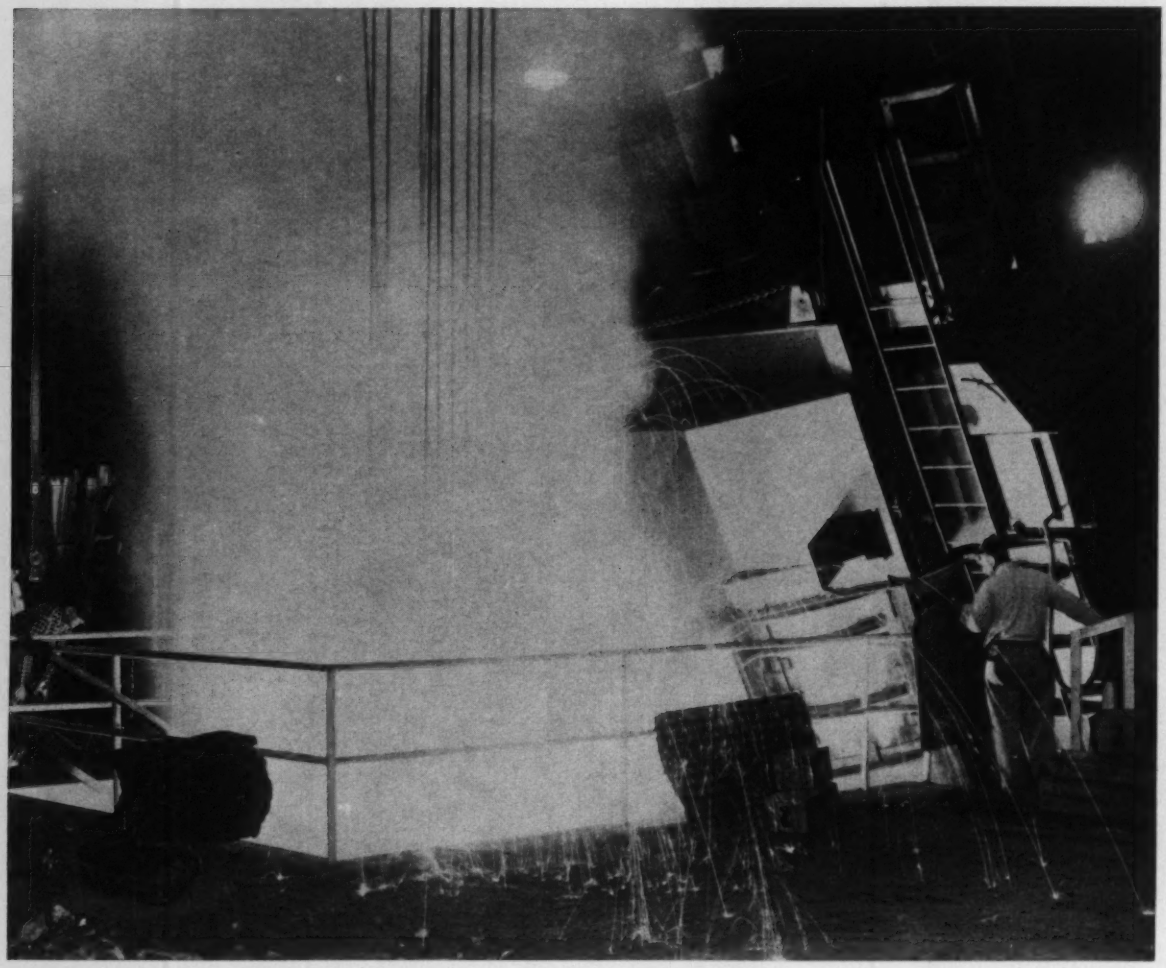
ENGINEERED TO YOUR PARTICULAR REQUIREMENTS

ENGINEERING AND MANUFACTURING FACILITIES AROUND THE WORLD THROUGH ASSOCIATES IN FRANCE, GREAT BRITAIN, GERMANY, ITALY AND JAPAN



Steel is tapped from Birdsboro's largest electric; this furnace and two other shells in the company's foundry permit melting of heats weighing 4 to 45 tons

Switch to Electric Melting Boosts Foundry Flexibility

Use of arc furnaces in three sizes permits the company to produce large or small heats and to make castings in several sizes. Old open hearths are being removed

INSTALLATION of two, new, electric arc furnaces is expected to make for more efficient steelmaking in a relocated foundry melting department at Birdsboro Corp., Birdsboro, Pa.

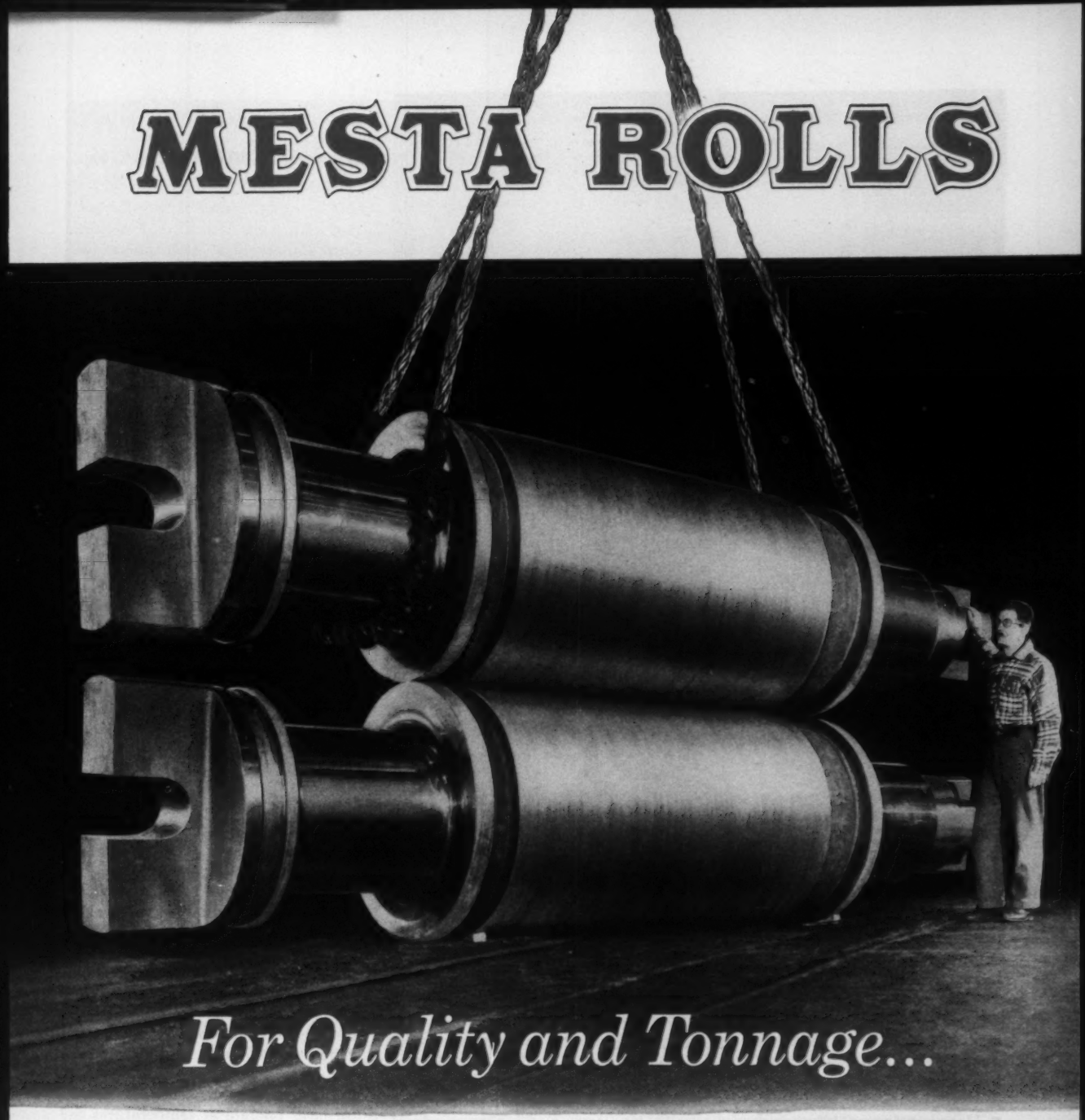
The new shells, part of an improvement and expansion program that has cost about $1.75 million, will boost the company's electric furnace steel output to about 300 tons daily.

• Revamp of the melting facilities allows the company to make smaller heats of carbon or alloy steels.

One of the new furnaces has an 8 ft shell and a melting capacity of 4 to 9 tons. Its heats are expected to average about 5 tons, with a melting rate of 2 tons an hour. The other new shell is 13½ ft in diameter and will handle charges of 20 to 45 tons. The average heat will be about 28 tons, with an average melting rate of 7 tons an hour. The company's present electric, which has been in operation about five years, melts heats of 8 to 20 tons. Heats average about 15 tons in the 11 ft shell, with a melting rate of about 5 tons an hour.

The company is able to meet the rising demand for high quality stainless and other high alloy steel

MESTA ROLLS



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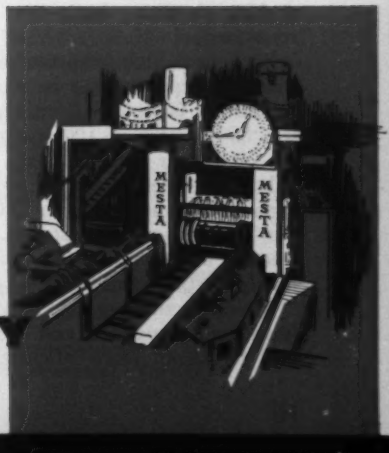
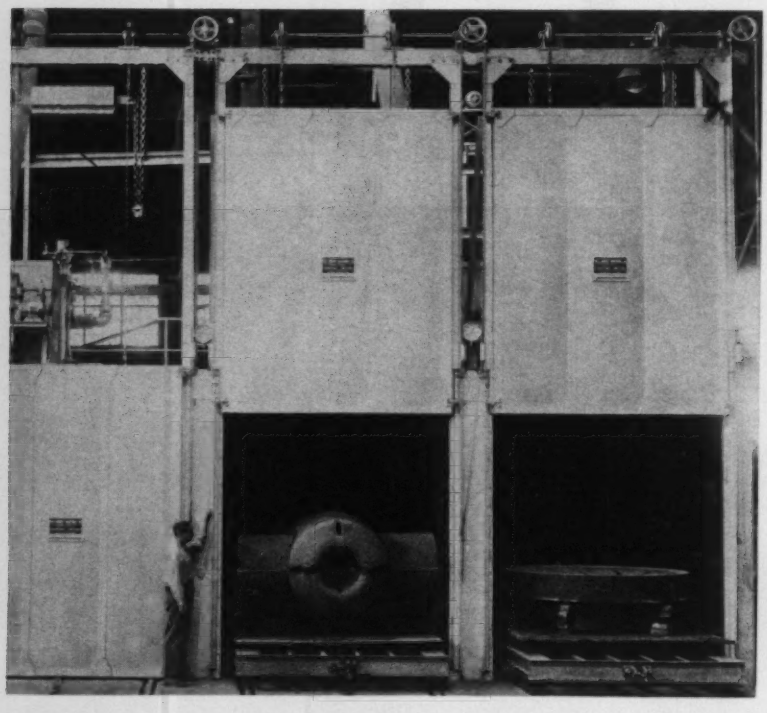
- Mesta Chrome-Moly Cast Steel Rolls
- Mesta Hi-Alloy Cast Steel Rolls



Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA



Cores for large castings are loaded into two compartments of the company's new, four unit oven, which gives the foundry's core capacity a 30 per cent boost

castings. Previously, products were limited to carbon and low alloy steels.

The foundry can produce alloy steels in melts as small as 4 tons, vs. minimum melts of 8 tons in the open hearth furnaces previously used. That is said to permit smaller orders to be taken, to make for more efficient heat scheduling, and to improve delivery.

The foundry can turn out castings weighing 50 to 75,000 lb. In some shapes and dimensions, castings up to 100,000 lb can be made.

• Heat treating, molding, and coremaking facilities have also been renovated.

Two, new, high temperature, heat treating furnaces have been added to existing facilities. Both furnaces —a 50 ton and a 100 ton unit— are of the car bottom type. Recirculating water quench facilities, capable of handling up to 15,000 lb per load, have been installed. Heat treating and quenching facilities are on the casting cleaning floor.

Molding and coremaking shops have been expanded and reorganized to permit more efficient, continuous flow of work from molding—at one end of the foundry—to a point at the other end of the shop where castings are rail shipped to the cleaning department.

A modern, sand handling system is expected to reduce sand handling costs 50 to 60 per cent and make for better casting quality. Base sand is transported pneumatically in overhead pipes at 25 to 30 tons per hour. Two, new storage silos (with a capacity of 600 tons each) and a dryer protect the sand from moisture and low temperatures.

Other major equipment added: A 10 ton and a 50 ton overhead crane; a four compartment core oven; an automatic sand shakeout machine with a dust collector; a stationary sand slinger that permits greater flexibility in the making of small, miscellaneous castings; and a 6 ton, mold rollover draw machine that takes the pattern from the mold.

Under consideration: Spending of an additional $450,000 for more foundry improvements, which would include new pattern shop facilities and increased pattern storage.

Small Stack Allows Study Of Blast Furnace Process

Construction is underway on a small, experimental blast furnace that will help United States Steel Corp. researchers understand the changes that occur as raw materials are reduced to iron in the intense heat of the stack, says S. M. Jenks, executive vice president, engineering and research.

The new facility, being built at U. S. Steel's Universal Atlas Cement Div. plant, Universal, Pa., will be operated by personnel from the corporation's research center at Monroeville, Pa.

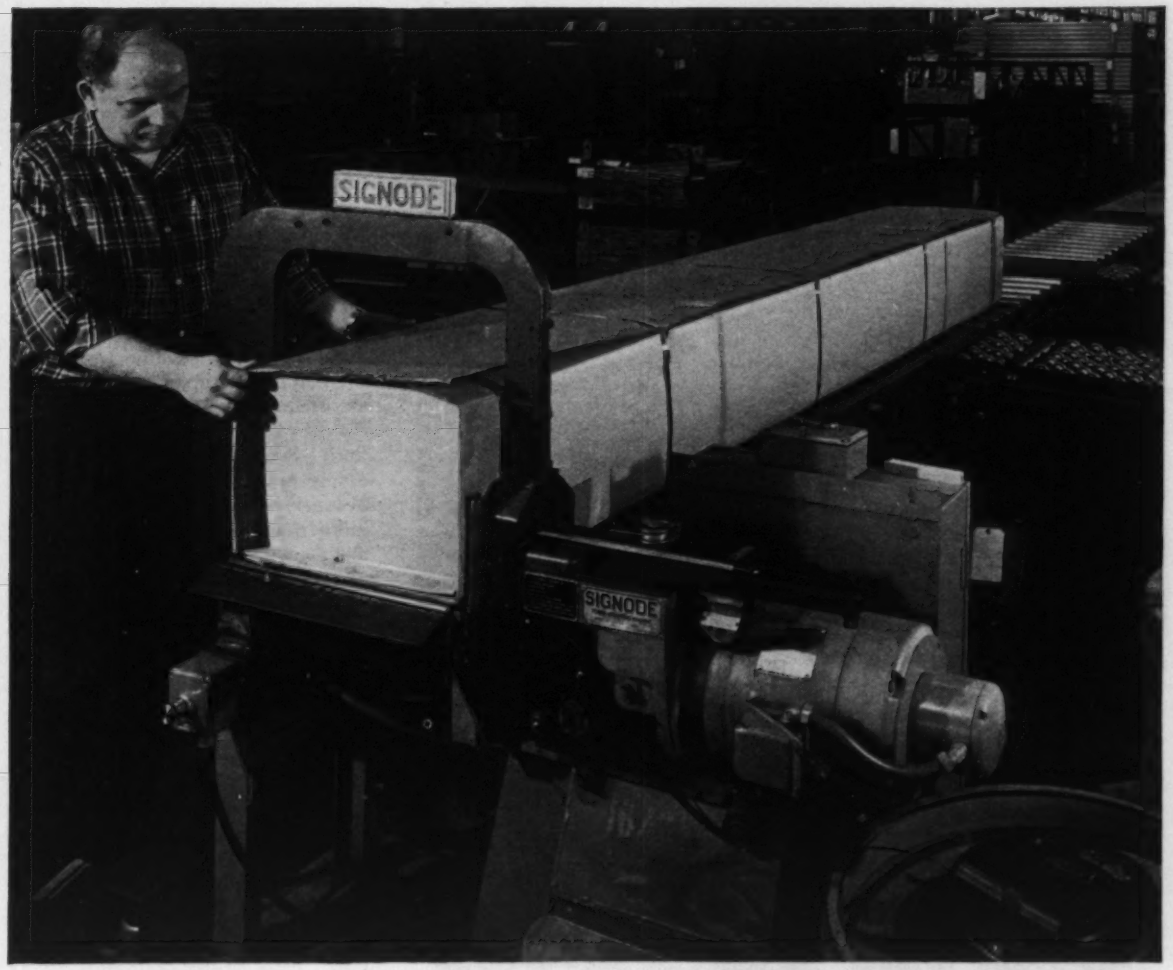
The furnace will have a hearth diameter of 4 ft. Its working height —from tuyeres to stockline—will be 19 ft 6 in. The stack is designed to operate at pressures up to 50 lb —well above the top pressures used in any production furnaces, says Mr. Jenks.

A complete chemistry laboratory will be available for the evaluation of data. Many advanced features, incorporated in the furnace and its auxiliaries, will permit the research team to study interior characteristics during operation. Automatic probes that can be inserted while the furnace is operating will record gas combustion temperatures; an infrared analyzer will continuously monitor top gases. Automated stockhouse equipment will size, weigh, and charge raw materials. Openings in the side will permit pressure readings to be taken over the entire stack height.

Other advanced features: Positive displacement blowers that will generate 5000 cu ft of blast air per minute and stoves that will heat air to a maximum of 2500° F. Few furnaces operate at temperatures as high as 2000° F, says U. S. Steel.

Lance Cuts Doorways

A powder-lancing process, developed by Linde Co., a division of Union Carbide Corp., was used to cut doorways in concrete walls of a building at Hill Air Force Base near Ogden, Utah. Iron and aluminum powder fed through the lance was mixed with oxygen. A 10 x 10 ft opening was cut by one man in an 8 hour day vs. ten days by jackhammer crews.



New Signode high-speed strapping machines

It's simple. The operator positions the package or bundle, steps on the foot switch, and the strapping is applied, sealed, and severed in seconds ...more than fast enough for the highest production rates.

New M-20 Series machines apply strapping smoothly, without impact, without denting or marring your product. They maintain uniform tension at any desired value between 50 and 1500 pounds.

Life tests and up to five years of industrial operation prove that M-20 machines complete half a million strapping operations before requiring more than routine maintenance.

Strap ends are joined mechanically with a metal seal that visibly insures a proper joint regardless of dirt, paint or oil. 3-HP motors insure against overloading even at maximum tension. Easy to use, easy to learn to use. Packages can move through the machine in either direction.

Each M-20 Model straps a wide range of mixed package sizes.

This new series of six standard M-20 machines is the result of 15 years of Signode experience in designing and building most of the power strapping machines now in use.

Write or wire
today for your free copy of fact-packed booklet, "Signode M-20 Series Standard Power Strapping Machines."

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How to Standardize Your Fasteners

Supplier says impractical specifications add to the cost of purchasing, inventory, and assembly. You can improve product design and cut fabricating costs via selection

YOU CAN probably meet your plant's fastener requirements with about 50 per cent fewer types and sizes than you are now using, says F. E. Graves, assistant technical director, Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

He estimates that a few hundred of the 400,000 available standard and special fasteners account for more than 80 per cent of the volume used, adding: Because of the increasing number of special purpose fasteners, customers sometimes overlook opportunities for improving design and cutting costs with the most used screws, nuts, and bolts.

The places to start, says Mr. Graves, are in design and purchasing.

• **Check Product Design**—Unless the need for standardization is stressed in the design department, impractical specifications can crop up, says Mr. Graves. He cites one rule that's easy to abandon: "Using four bolts for a balanced joint on flanges, cover plates, and similar products. Three stronger bolts can provide a joint that's just as stable. In terms of holding power, the stronger the bolt the less it costs."

Fewer fasteners also cut production costs by eliminating drilling or punching operations for the extra hole. Three-bolt design also improves product appearance and reduces steps in assembly.

Another example: Head styles are frequently specified by designers with little consideration for function. Socket head screws, for example, are essential where a recessed fastener is needed. They also cost more than hex screws and require an extra counterboring operation. Screw head styles used on mechanized assembly lines should be chosen with the wrench or driver in mind. "Where possible, we advise that one style of round head and one style of countersunk head screw should be picked out for assemblies," says Mr. Graves.

Ordering fewer types and sizes of fasteners lowers buying and assembly costs and reduces stock handling and inventories

• **For Purchasing Agents**—The purchasing agent plays a vital role in clarifying fastener usage. Preferably he should do the job with the standards engineer or with managers in design and production. Here are seven guides offered by Mr. Graves:

1. Be careful of inconsistencies in language. Example: Three purchasing agents sent orders to a manufacturer. The first ordered "hex head no nut"; the second, "brt capscrew NC"; the third, "fin hex bolt no nut." The manufacturer filled each order from the same bin. To help meet the language and terminology problem and aid standardization, Russell, Birdsall & Ward has brought out a simplified nomenclature system.

2. Reduce the number of head styles. Mr. Graves says an inventory of round head and flathead screws will serve many purposes and simplify stock handling. Carry hex head bolts for wrenched assemblies.

3. Standardize on bolt types. The SAE standard lists eight physical classifications of properties for screws and bolts, but three provide a range of tensile strengths wide enough for many applications:

Depending on diameter, SAE Grade 1, 55,000 psi; Grade 2, 68,000 psi; Grade 5 (high tensile fastener identified by three radial dashes on the screw head and on the nut) 120,000 psi.

Grade 1 is used for fasteners which are annealed to increase ductility. Grade 2 provides low carbon fasteners with a bright finish. Grade 5 goes into high carbon, heat treated black fasteners. The three grades can handle almost every assembly job, maintains Mr. Graves. Alloy fasteners should be used for problems such as extreme temperature, corrosion, or where high stresses are encountered.

4. If possible, use two styles of nuts. Hex nuts give good seating area, sufficient height to sustain high thread tension, and enough wall thicknesses to control dilation under load. They're adequate for uses that don't require high strength.

Heavy nuts are 1/8 in. wider across the flats. They're used to carry heavy loads with large clearance holes or soft materials and to satisfy certain requirements.

Since conditions requiring heavy nuts are usually encountered with bolts 3/4 in. or larger, some people save money by stocking the heavy series for bolts 3/4 in. and larger and hex nuts for the smaller sizes.

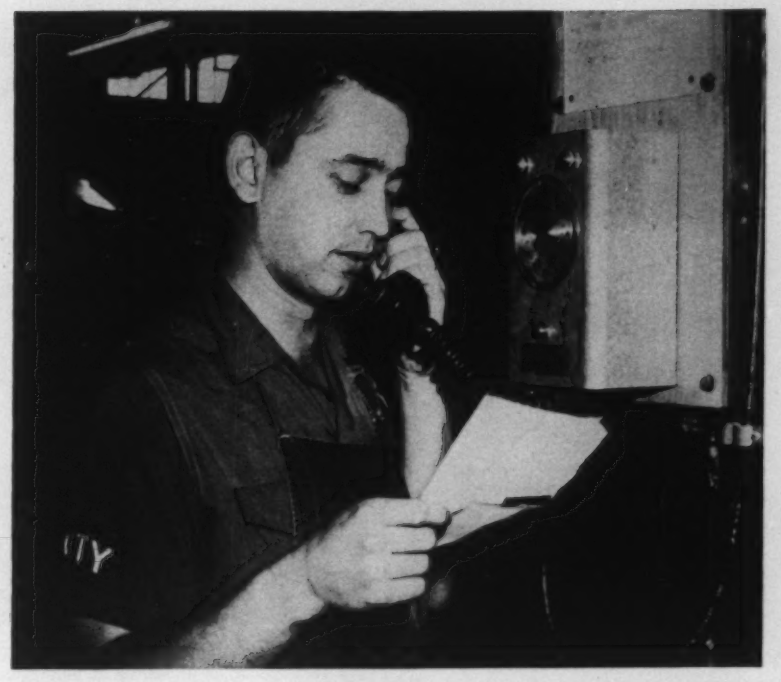
5. Eliminate in-between sizes. How far you can go depends on your product requirements. A large steel fabricator suggested designing around one diameter of high tensile bolt and calculating all strengths on that diameter.

Sometimes it's possible to standardize on 1/4, 1/2, 3/4, and 1 in. sizes and eliminate other sizes between 1/4 and 1 in. It might be more economical to change specifications to conform with available sizes than to add another item to stock.

Also go over your length requirements.

6. Look into the fine vs. coarse thread controversy. Assembly speed, strength, and other points are at stake here.

7. Forget thread fits. The standard UNC-2A (male) and UNC-2B (female) in the new unified thread series are commercial fits. They provide allowance for plating and fast assembly. Other classifications can be used for special applications.



Telephone stations are used to transmit job and time information to a central point. Tape recording system stores data for accounting entries

Phone-Tape Recorder Setup Automates Timekeeping

TIMEKEEPING is automated at the plant of National Electric Welding Machines Co., Bay City, Mich.

A combination of telephone stations and tape recording equipment has saved production time, improved timekeeping accuracy, and increased accounting efficiency.

• When a production worker begins his day's assignment, he picks up a special telephone and reports his presence, his clock and job number, and the time.

The information is automatically transcribed onto magnetic tape in the accounting office. The recorder does not operate continuously; lifting the telephone turns it on.

• When the job is finished, the worker returns to the phone station, checks out the completed work and details his next assignment.

The same procedure is followed by the worker for each job change during the day.

Telephones in the special call circuit are so arranged that no production worker is more than 25 ft away from a station. To date, 15 phones have been installed, arranged in three circuits of five phones each.

• In the accounting office, a bank of three recorders is used to record the information.

A fourth unit serves as a standby, takes over if one of the operating recorders fails to work. And if an employee is recording when another phones in, the second recorder in line takes over. A control console lets the timekeeper on duty see at a glance which phones are recording, and a call-back circuit permits the system to be used for two-way communication.

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Eastern Malleable Iron Co., Naugatuck
New Haven Malleable Iron Co., New Haven 4

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

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MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
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Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI
Mississippi Malleable Iron Co., Meridian

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Laconia Malleable Iron Co., Laconia

NEW YORK
Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
Maumee Malleable Castings Co., Toledo 5
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
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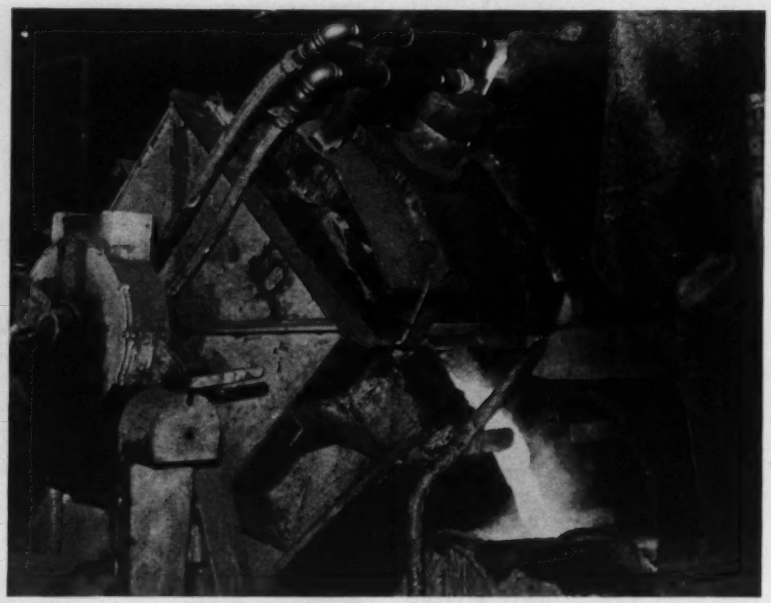


Flame from a pulsating gas burner is directed downward on molten metal in the forehearth, maintaining a temperature of 2600 to 2800° F

Pulsating Gas Burners Heat Foundry Forehearths

COKE OVEN GAS rated at 490 Btu is burned in pulsating burners to maintain temperatures of 2600 to 2800° F in foundry forehearths at the River Rouge plant, Ford Motor Co., Dearborn, Mich.

The burners, supplied by E. W. Bliss Co., Canton, Ohio, are mounted on the tops of the forehearths and directed downward on molten metal from a cupola.

• Combustion creates extreme turbulence in the burners, causing intimate intermixing of fuel and air.

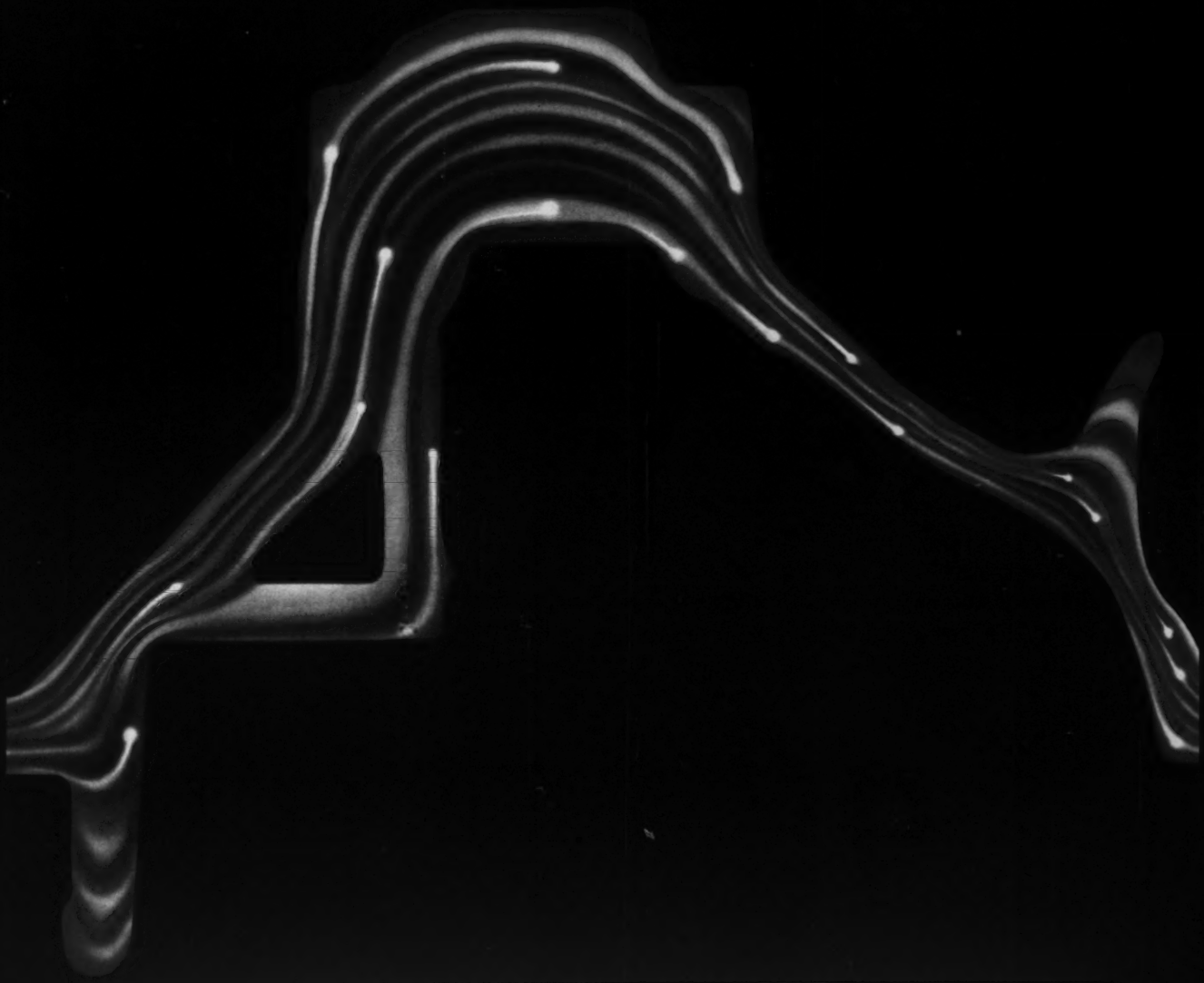
The pulsating units are of the No. 4 aspirator type. Flexible hoses bring fuel and air to the burners. Fuel comes from the company's coke ovens; air is supplied by a blower system, with a compressed air system for standby. The flame, which is said to burn efficiently over its entire range, is easily controlled by fuel and air flow adjustments.

Flame velocity, a vital factor in combustion efficiency, is said to approach 600 ft a second vs. 50 ft a second in many burners. An independent testing laboratory credits the units with a heat release rate of 5.5 million Btu per cubic foot.

• Design of the burners is said to make higher flame temperatures possible.

Use of conventional industrial burners has been limited in some applications because of their inability to develop flame temperatures above 2900° F with gas and 3100° F with oil. (Pulverized coal can produce flame temperatures of about 3300° F.)

Burners of the pulsating type produce flame temperatures of 3300° F, using 1000 Btu per cubic foot of natural gas, or 3450° F, with fuel oil. And they are said to reduce furnace maintenance and fuel handling costs.



Liquid flow through a cross section of a Malleable differential carrier.

For Performance-Tested Dependability...Use Malleable

Molten metal flows evenly into all parts of the mold, then solidifies into pre-shaped parts with uniformly dependable properties throughout. Malleable iron castings will stand up under extremes of tension, impact, torsion, shear, fatigue, wear, heat, cold, and corrosion. They also offer maximum economy, are easy to work, and are versatile enough for parts ranging from a few ounces to hundreds of pounds.

The more manufacturers know about Malleable castings, the more they use Malleable to improve quality and increase profits. Get the full story on Malleable ... Contact any of the progressive companies that display this symbol —

MEMBER

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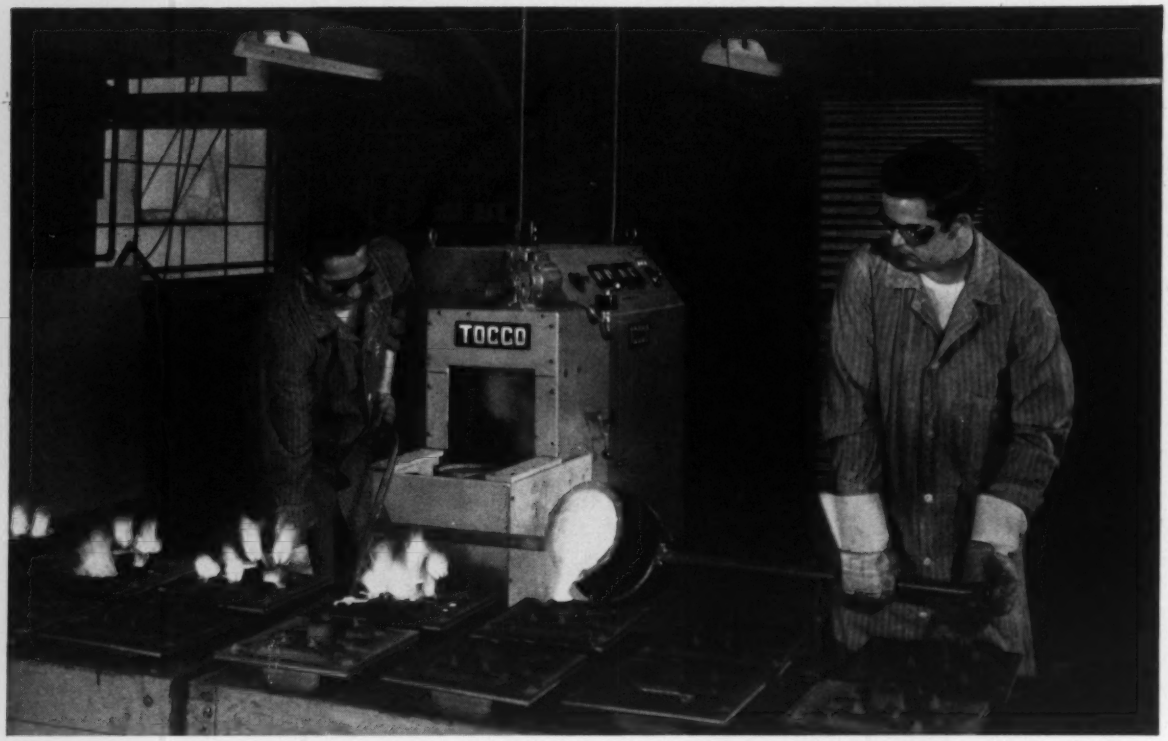
CASTINGS COUNCIL

For details on Malleable's uniformity and reliability contact any company listed on the opposite page, or Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.



TOCCO* Induction Heating

melts bronze, aluminum and stainless steel for high-precision, porous-free castings

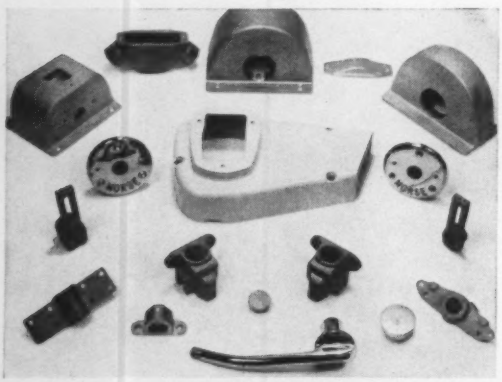
Morse Instrument Company, Hudson, Ohio, manufacturer of marine hardware and control instruments, recently switched from conventional furnaces to TOCCO Induction Melting. Results: greater speed, better working conditions and, above all, purer, sounder castings.

"Castings are free from porosity since we switched to TOCCO Induction Melting," reports president John Morse. "This is a sales advantage to us and a tremendous quality advantage for our customers."

Whether you're interested in melting ferrous or nonferrous metals, TOCCO Induction Melting offers you these important advantages:

- **Stepless Power Control**
- **Extremely Rapid Melting**
- **High Efficiency—Even on Intermittent Operation**
- **Good mixing because of Natural Agitation**
- **Extremely Low Alloy Loss**
- **No Contamination when Composition of Charges is Changed**
- **High Reproducibility of Results**
- **Minimum Space Requirements**
- **No Special Installation Charge**
- **Simple, Safe Operation**
- **Clean, Comfortable Working Conditions**
- **No Carbon Pick-up**

If any of these advantages suggest economies in your operations, write for full details—no obligation, of course.



Sample castings produced by Morse Instrument Company with new shell molding process and TOCCO Induction Melting.

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Please send copy of "The Case for TOCCO Induction Melting".

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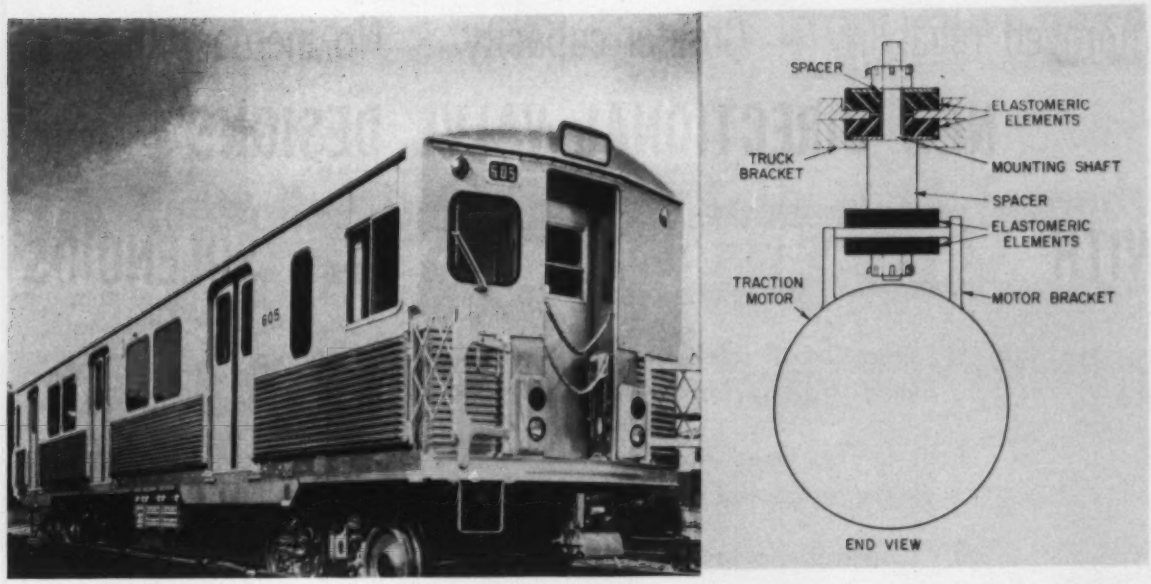

Traction motors hang on flexible mounts (right) in a new fleet of cars for Philadelphia commuters. Noise, shock, and vibration are isolated in the wheel trucks

Rubber Mountings Soften Rail Car Noise and Shock

Disturbances originating in car components are kept from structure and passengers; road shock isn't allowed to interfere with motor, generator, or compressor operation

CONTROL of vibration, shock, and noise received a lot of attention in the design of 270, subway-elevated rail cars which will soon serve Philadelphia commuters.

Flexible suspension systems, consisting of bonded rubber mountings, are used throughout the cars, which were built by Budd Co., Philadelphia. The suspension systems were engineered by Lord Mfg. Co., Erie, Pa.

• Lightweight construction is said to accentuate the need for vibration damping and noise control.

Use of stainless steel reduced car weight to 25 tons—3 tons less than a conventional car. Research findings and projections by City of Philadelphia engineers indicated a power cost saving of about $2.5 million for the fleet, over a 35 year depreciation period. And the elimination of periodic painting and corrosion repair is expected to save the city about $15,000 per car over that same period.

Vibration, shock, and noise disturbances had to be isolated to protect car components and prevent excessive maintenance expenditures.

• Flexible mountings protect supported equipment from external disturbances; they also isolate the car and passengers from the noise and vibration the equipment generates.

Shear sandwich mountings at the front and rear of each truck bolster provide restoring force after the car rounds a curve.

Traction motors, directly connected to axle mounted, gear drive units, are secured to the wheel trucks by a vertical shaft and four rubber flexing elements. Sudden torque impulses and wheel-to-rail shocks are isolated in the trucks.

Four compression loaded mountings secure a 3 kw generator to the car undercarriage. The mountings isolate high frequency vibration of the armature inside the generator housing; they also keep car motion from interfering with generator operation.

The air compressor, which weighs 1200 lb, is held to the undercarriage by four, axially soft mountings. They cushion the fore and aft movement of the compressor—reducing stresses in the mounting frame—and isolate low frequency, high amplitude vibrations.

Vibrations from four ventilating fans are isolated from the ceiling of the car by bonded rubber mountings.

Have you entered **STEEL's Usership Idea Contest?**
See Pages 5 and 6.

Improved reliability • Greater capacity • No increase in price

NEW DIRECTIONAL VALVE DESIGNS

WITH VICKERS Q-E-L* SOLENOIDS

- New Q-E-L* solenoids assure quiet, cool operation plus shock-free performance through superior cushioning.
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- Capacity increased from 50 to 500% on new designs.
- All models suitable for pressures to 3000 psi.
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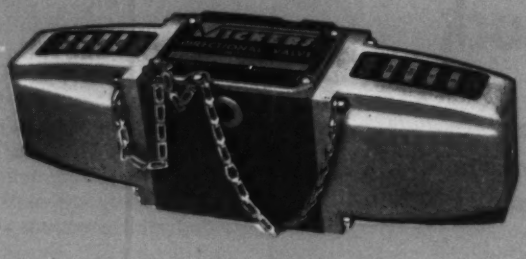
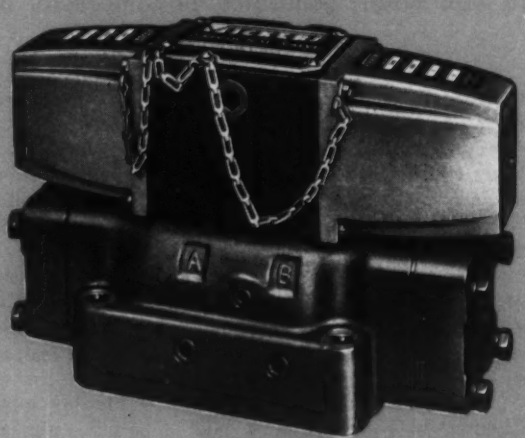


MODEL DG4S4 is rated at 8 gpm (with nominal pressure drop) with a maximum allowable capacity of 12 gpm without malfunction. Maximum recommended operating pressure is 3000 psi. Standard subplates are available with ⅜ in. or ½ in. pipe thread ports. SAE straight thread port connections can also be provided.

MODEL DG5S4 solenoid-controlled, pilot-operated valve is rated at 30 gpm (with nominal pressure drop) with a maximum capacity of 80 gpm without malfunction, depending on circuit conditions and valve type. Standard subplates are available with ¾-in. and 1 in. pipe thread connections. SAE straight thread port connections can also be provided. Write for Catalog 5001-C.



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* Q-E-L designates Quiet Extended Life solenoid—a *Vickers exclusive.*

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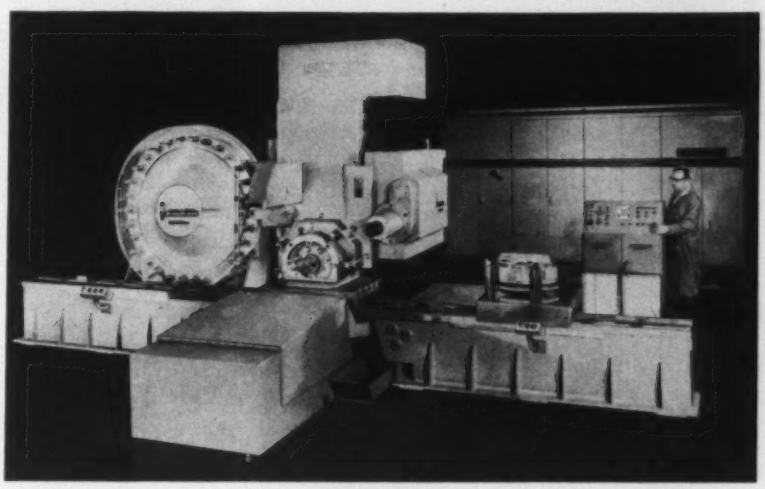
Tape Controlled Unit Changes Tools in 15 Seconds



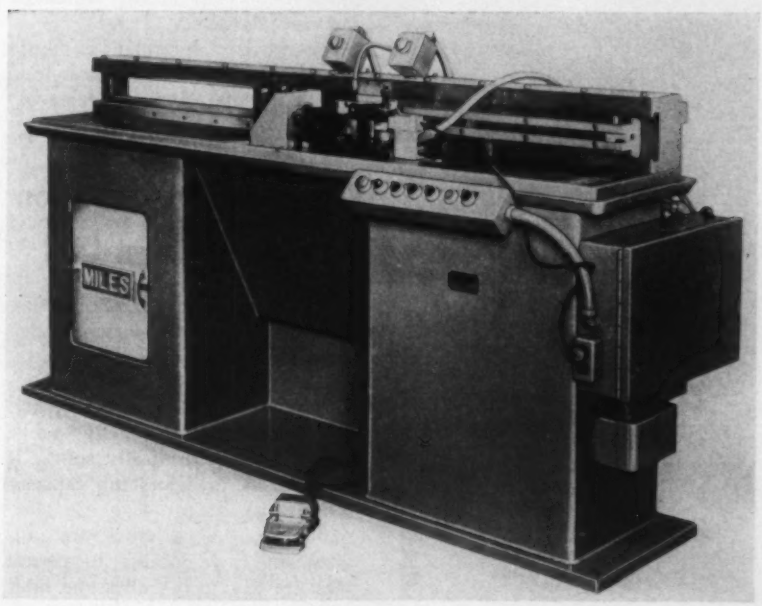
THE AUTOMATIC tool changer magazine on the Milwaukee-matic Model III has a capacity for 30 tools plus one in the spindle. It can make changes in 15 seconds. The tape controlled unit can do milling, drilling, boring, reaming, tapping, and other operations.

Maximum tool diameter is 6 in. Total spindle movement includes 44 in. in the longitudinal (X) axis, 34 in. in the vertical (Y) axis and 32 in. in the depth (Z) axis. A 15 hp, spindle drive motor provides power to three speed ranges from 50 to 2000 rpm in 10 rpm increments. Maximum tool setting distance is 12 in.

Feed rates range from ½ to 49 ipm in ½ ipm increments. The rapid traverse rate is 150 ipm. The rotary table automatically indexes 360 degrees in 1 degree increments. Work pallets (28 x 36 in. surface area) are automatically transferred to and from the rotary table on pallet shuttles. Work is set up on the pallet shuttle during machining to eliminate machine downtime.

For further information, *write* Kearney & Trecker Corp., 6800 W. National Ave., Milwaukee 14, Wis.

Interchangeable Cylinders Extend Unit's Capacity



YOU CAN schedule precision internal or external broaching on a production or short run basis on the Universal horizontal broaching machine. Units are available in capacities of 1, 2, or 3 tons, stroke lengths to 72 in. and ram speeds from 40 to 100 feet per minute. Self-contained, the unit accommodates simple tooling or fixtures that can be interlocked with the machine cycle.

The horizontal design of the machine permits a long power stroke in a compact unit. The arrangement increases the range and types of work that can be handled. Interchangeable hydraulic ram power cylinders enable the user to further extend the machine's capacity or operating speed.

Hydraulic power is supplied by a package unit that slides into the base of the machine. The package con-

sists of a heavy duty hydraulic pump; 60 cycle motor (220/440 volt, three phase); pressure valve; solenoid operated, four way valve; speed control valve; and hydraulic fluid reservoir.

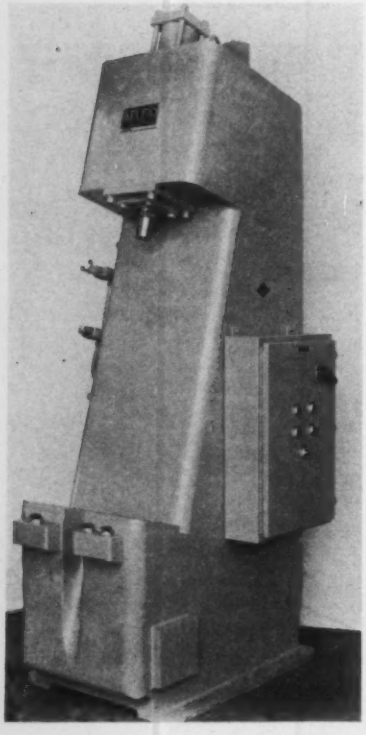
The company says extremely accurate, long stroke broaching is possible because the slide (on which the broach or cutting tool is mounted) moves between heavy section ways. That ensures accurate horizontal passes during the cutting stroke.

For further information, *write* Ty Miles Inc., Box 446, Elmhurst, Ill.

High Speed Jobs Easy for Hydraulic Press Line

A SERIES of straight line, high speed, hydraulic presses has been developed by Sidney Elevator Mfg. Co. Capacity ratings: 1 to 50 tons.

The first of the series (Model HFI-10-C-9-23) is rated at 10 tons. The unit has a 21 in. stroke, a bed area of 9 in. from front to back and 23 in. from left to right, and a height from the floor of 30 in. Approach speed is 120 in. per minute, pressing speed is 60 in. per minute, and return speed is 120 in. per minute. Ram diameter is 3½ in. The 7½ hp motor develops 1800 rpm. The throat is 5 in. and the daylight is 41 in. Pump capacity is 10 gallons per minute. The unit has a 20 in. shut height and weighs about 3750 lb. Larger bed and slide areas can be provided and other specifications, bolster plates, and bed openings can be altered to meet requirements. Die cushions are optional.



Typical applications: Broaching, bending, forming, stamping, plastic molding, high production riveting, plastic and diecasting trimming, powdered metal compacting, and deep draw operations.

For further information, *write* Sidney Elevator Mfg. Co., Box S, Sidney, Ohio.

Automatic Belt Tracking Added to Flat Finisher

LONGER BELT life, better finish, and labor savings are advantages cited for the addition of automatic belt tracking and oscillation to Hammond's flat finishers.

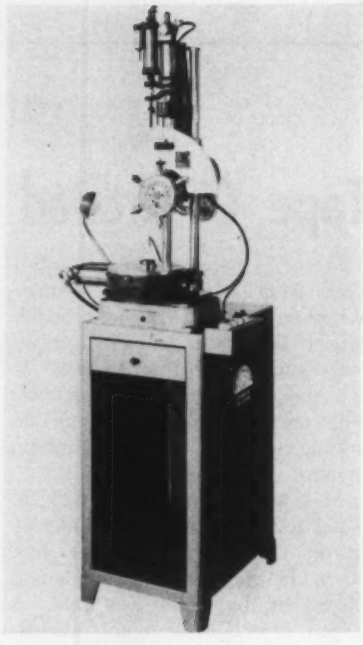
After the tracking is set, no attention is required until a new belt is installed. The units are available with single or multiple heads for belt widths of 6, 8, and 12 in. The high production units do wet abrasive belt grinding, polishing, and deburring.

For further information, *write* Hammond Machinery Builders Inc., 1611 Douglas Ave., Kalamazoo, Mich.

Power Feed Automatic on Six Spindle Turret Drill

POWER feed and turret indexing are automatic on the bench model, six spindle turret drill built by Burgmaster. Featured are controlled, infinitely variable, power feeding and preselective, individual, spindle speeds that automatically shift. It has a ¼ in. drill and tap capacity in steel.

Individual depth stops are provided for each spindle to permit rapid traverse to the work and limit depth of cut. With manual operation, you get single spindle operation with power feed and turret indexing only at a pushbutton signal. In semiautomatic operation, the turret cycles through a predetermined sequence of operations including skip index of idle stations, and stopping for manual load and unload. In automatic operation, the controls are interlocked to synchronize with such things as shuttle tables, index features, hopper feeds, air blasts, and coolant.



For further information, *write* Burgmaster Corp., 15001 S. Figueroa St., Gardena, Calif.

Bandsaw for Light Jobs Has 12 in. Work Height

FAST, LIGHT duty production jobs can be done by DoAll's Model 1612-UGT bandsaw. The unit has a 16 in. throat and a 12 in. work height. The 24 x 24 in. worktable has 12 in. of manual travel or 8 in. of travel with the weight type, power feed attachment. A work stop and mitering attachment are furnished. The table may be locked to do contour cutting as on fixed table machines.

Infinitely variable band speeds from 50 to 5200 fpm in two ranges enable use of a 1 hp motor and a wide range of saw bands from 1/16 to ½ in. wide.

Other DoAll developments include

"A major cost-reduction must come from costs other than direct labor and material costs! Management must pin-point actual materials handling costs"

You can best reduce manufacturing costs with...

R-W "TWIN-TRAK"
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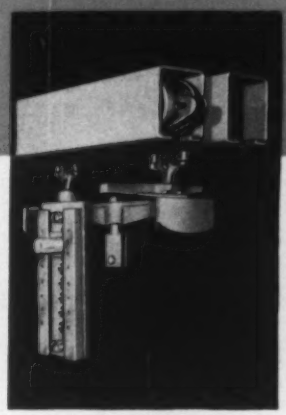

An R-W "TWIN-TRAK" Overhead Automatic Dispatch System consists of one or more Power Tracks and as many Storage or Load Tracks as desired plus Switches, Carriers, Accessories and Power Equipment. "TWIN-TRAK" Systems are economical to install, operate and maintain . . . easily expanded, altered or relocated as necessary.

Industry's prime goal throughout the '60's will be to achieve substantial manufacturing cost-reductions. The handling of materials offers the greatest cost-cutting frontier and reduced costs will be accomplished only with a true "integrated" materials handling system . . . a system that co-ordinates all processing functions on a *door to door* or *plant wide basis.*

R-W "TWIN-TRAK" Systems offer this materials handling concept of tomorrow—*today*. For here is a completely automatic conveying system that not only moves products from one point to another, but automatically conveys parts and components to predetermined work stations throughout all production processes . . . parts and components that are automatically selected "from overhead" inventory banks and conveyed *where* they are needed—*when* they are needed. R-W "TWIN-TRAK" Systems not only improve materials handling but also permit the co-ordinated use of new production techniques and machinery to provide "machine muscle" for the raising, lowering, moving and transferring of parts and components to produce products faster and more economically. Now is the time to investigate the "cost-saving" potential offered by an R-W "TWIN-TRAK" Overhead Automatic Dispatch System.

If you are planning to modernize your present plant or build a new one, it will be to your advantage to let a qualified R-W Materials Handling Specialist survey your facilities or plans. At no obligation, he will gladly submit a plan to show you how to best solve your specific materials handling problem. Write for "TWIN-TRAK" Catalog.

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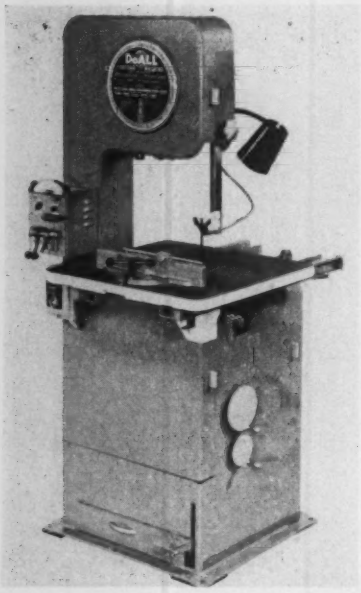


a new drive system with 60 per cent greater power on the C-69 and C-70 power saws. The C-69 has an automatic cutting head cycle with manual work indexing. The Model C-70 is fully automatic.

For further information, *write* DoAll Co., Des Plaines, Ill.

Shaft Mounted Unit Gives Reduction Ratios to 270:1

FEATURES SUCH as control flexibility, high torque capacity, and compact size are provided by a shaft mounted, rotating transmission.

The unit (called Roto-Mission) gives reduction ratios up to 270:1 exclusive of additional reduction through pulley drive from the drive motor. The entire transmission (differential planetary type) is contained within the outer surface, which is machined for V-belt drive from a motor.

The driving action can be engaged or disengaged through mechanical, electrical, pneumatic, or hydraulic means. Dual speed operation can be provided by various methods of clutching. With auxiliary devices, it can be set up for load limiting or releasing and overload alarm.

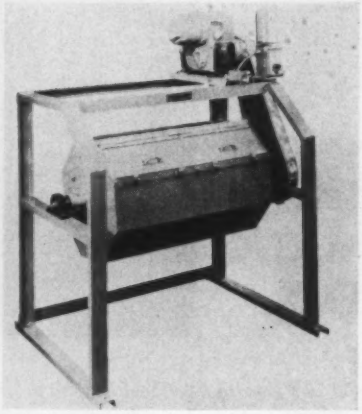
Capacities are available from fractional ratings through 60 hp and for torque ratings through 21, 850 lb-ft in standard models.

For further information, *write* Industrial Div., Airborne Accessories Corp., 1414 Chestnut Ave., Hillside 5, N. J.

For Metals, Plastics: Five Tumbling Units

A LINE of five different barrel finishing units is offered for finishing and definning metal and plastic parts.

The machines (Type LS) have barrels from 21 to 30 in. in diameter and 20 to 48 in. long with single or double compartments. Standard equipment includes a welded channel iron framework; octagonal, patented, sheet steel barrels with hard maple liners; guarded chain drive; variable speed motor; unloading tray and screens; and a removable door with quick opening latches. Other equipment is available.

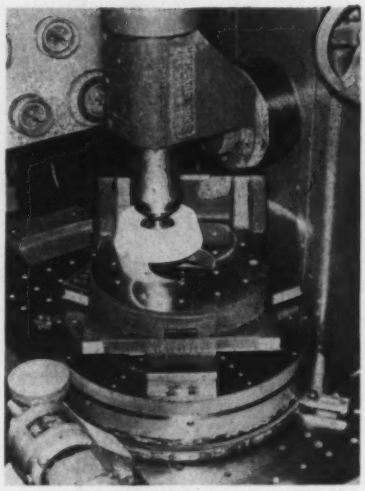


Several drives can be obtained. Overhead motor mounting is standard. Horsepower ratings range from ½ to 1.

For further information, *write* Tumbl-L-Matic Inc., 25 St. Marys St., Stamford, Conn.

Rotary Table Suitable for Production or Inspection

RUNOUT AND parallelism accuracy of 5 millionths of an inch is a feature of the Ultraron rotary table. Applications include inspection, grinding, and lapping operations.



The table has a heavy steel base, a matched set of steel balls, and a revolving top plate with tapped mounting holes. The steel in the tables is stabilized by heat treatment.

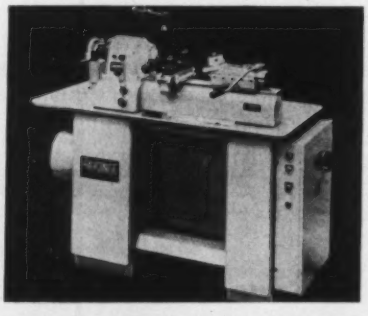
The 17 in. (diameter) Ultraron shown has a height of 4½ in. It weighs about 300 lb and can support a 1000 lb load. Other table sizes (from 6 to 96 in. in diameter) and motorizing equipment are available on special order.

For further information, *write* AA Gage Co., 350 Fair St., Detroit 20, Mich.

Second Operation Lathe Does High Precision Work

PRECISION work such as forming, cutting off, facing, and taper turning can be done on a production basis with the Model DSM59-R second operation lathe.

The unit has 1-1/16 in. round collet capacity through the spindle, step chuck capacity to 6 in., and a swing over the bed of 9 in. (diameter). Spindle speeds go up to 4000 rpm. The headstock spindle is



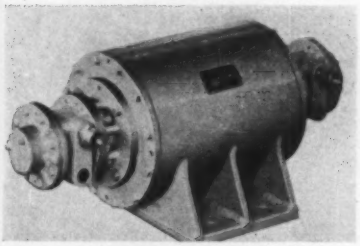
mounted on precision, preloaded ball bearings.

The spindle takes standard tooling, 5C Hardinge collets, step chucks, jaw chucks, and face plates. The base is arranged for kneeroom and has a foot rest for efficient operation from a sitting position.

For further information, *write* Hardinge Bros. Inc., 1420 College Ave., Elmira, N. Y.

12 Ton Unbalanced Force Developed by Vibrator

AT 3000 rpm, the DVP-24,000 vibrator, with pneumatic or hydraulic drive, can develop 12 tons of unbalanced force. The unit has stepless control of frequency from 0 to 3000 vpm.



The unbalanced force is generated by lead shot loading—removing or adding shot to the eccentric weight. The unit produces a low noise level and operates in any position.

For further information, *write* Martin Engineering Co., Neponset, Ill.

One Cycle Spring Maker Makes End Loops Too

WITH THE Baird spring generator, one cycle can produce an entire spring with formed end loops. Other applications include clips, clamps, coils, and related wire products in the 0.008 to 0.034 in. wire range.

The unit can make different end loops (including extended hooks). Several different spring types can be made. Production rate with a variable speed drive is 720 to 6400 pieces an hour. The machine weighs 420 lb and occupies 22 x 27 ft of floor space (less wire reel).

Standard equipment includes a pedestal base, five sets of feed change

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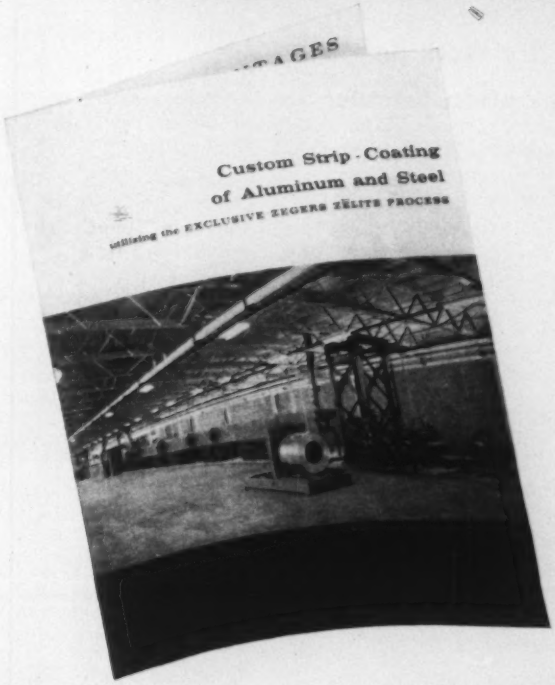

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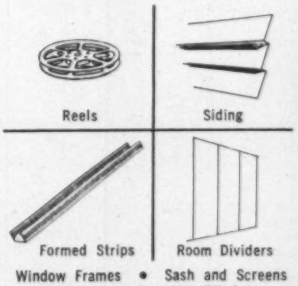

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gears for feed lengths to 26 in., one set of standard cams, one set of standard cam inserts for extended hook springs and torsional springs, one quill setting gage, and one set of gear and belt guards.

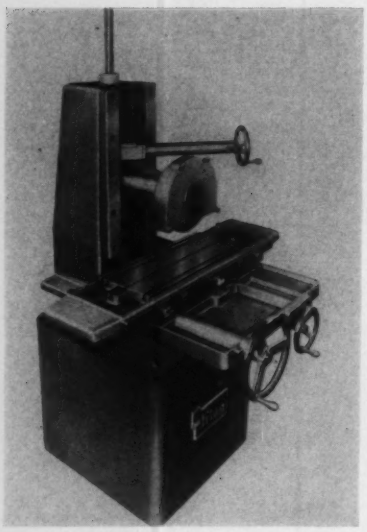
For further information, *write* Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.

Wet or Dry Work Handled By This Surface Grinder

"EXTRA capacity, low cost precision grinder" is the way King describes its manual control surface unit.

For wet or dry grinding, the machine (K-1020) has a longitudinal table travel of 20 in. and a 14 in. cross feed.

A grinding wheel diameter of 12 in. allows a 15 in. vertical clearance over the table.



The T-slotted table travels on precision ground ways and has adjustable table stops. It has a 10 x 20 in. working surface when used for wet grinding.

The grinder has a direct drive spindle, rotating on preloaded precision ball bearings, powered by a 1½ hp balanced motor. Magnetic chucks and other accessories are available. Floor space requirements are 63½ x 72 in. Height is 87 in.

For further information, *write* King Machine & Mfg. Co., 1171 E. 32nd St., Los Angeles 11, Calif.

NEW literature

Write directly to the company for a copy

Nitriding Presses

Case hardening of metals with anhydrous ammonia atmospheres in various nitriding applications is covered in a 14 page bulletin (TM-1). Amour Industrial Chemical Co., 110 N. Wacker Dr., Chicago 6, Ill.

Positioning Equipment Guide

Basic reasons for using positioning equipment, various kinds available, and the kind of work each is capable of performing are set forth in a 16 page guide. It explains how various pieces of equipment are rated. Ransome Co., Scotch Plains, N. J.

Variable Speed Drives

Where and how to use an infinite range, variable speed drive of high accuracy are shown in a bulletin (No. 551). Complete ratings and dimensions are given. Graham Transmissions Inc., Menomonee Falls, Wis.

Industrial X-Ray Wall Chart

"The ABCs of Industrial X-ray Film Processing" is a concise but comprehensive guide. X-Ray Div., Eastman Kodak Co., Rochester 4, N. Y.

Glasteel Data

A 20 page bulletin (No. 985) details the steps in manufacture, physical and chemical properties, and end use of Glasteel. Advertising Dept., Pfaudler Co., 1124 West Ave., Rochester, N. Y.

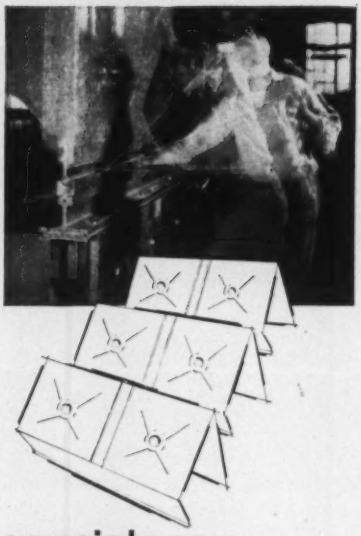
Titanium Alloy Tubing

A-40 unalloyed titanium and 3 per cent aluminum, 2.5 per cent vanadium titanium alloy tubing are covered in data memorandum No. 27. Listed are the chemical composition, physical properties, mechanical properties and size limits for seamless tubing made from both types of material. Superior Tube Co., 1585 Germantown Ave., Norristown, Pa.

NEW BOOK

Thermoelectric Materials & Devices, edited by Irving B. Cadoff and Edward Miller, Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y., 344 pages, $9.75

Progress made in the development of materials for thermoelectric devices is surveyed. Based on a special series of lectures given at New York University, contributions of 20 experts are included on subjects ranging from basic theory to device design. It also covers evaluation of materials being considered for future use.



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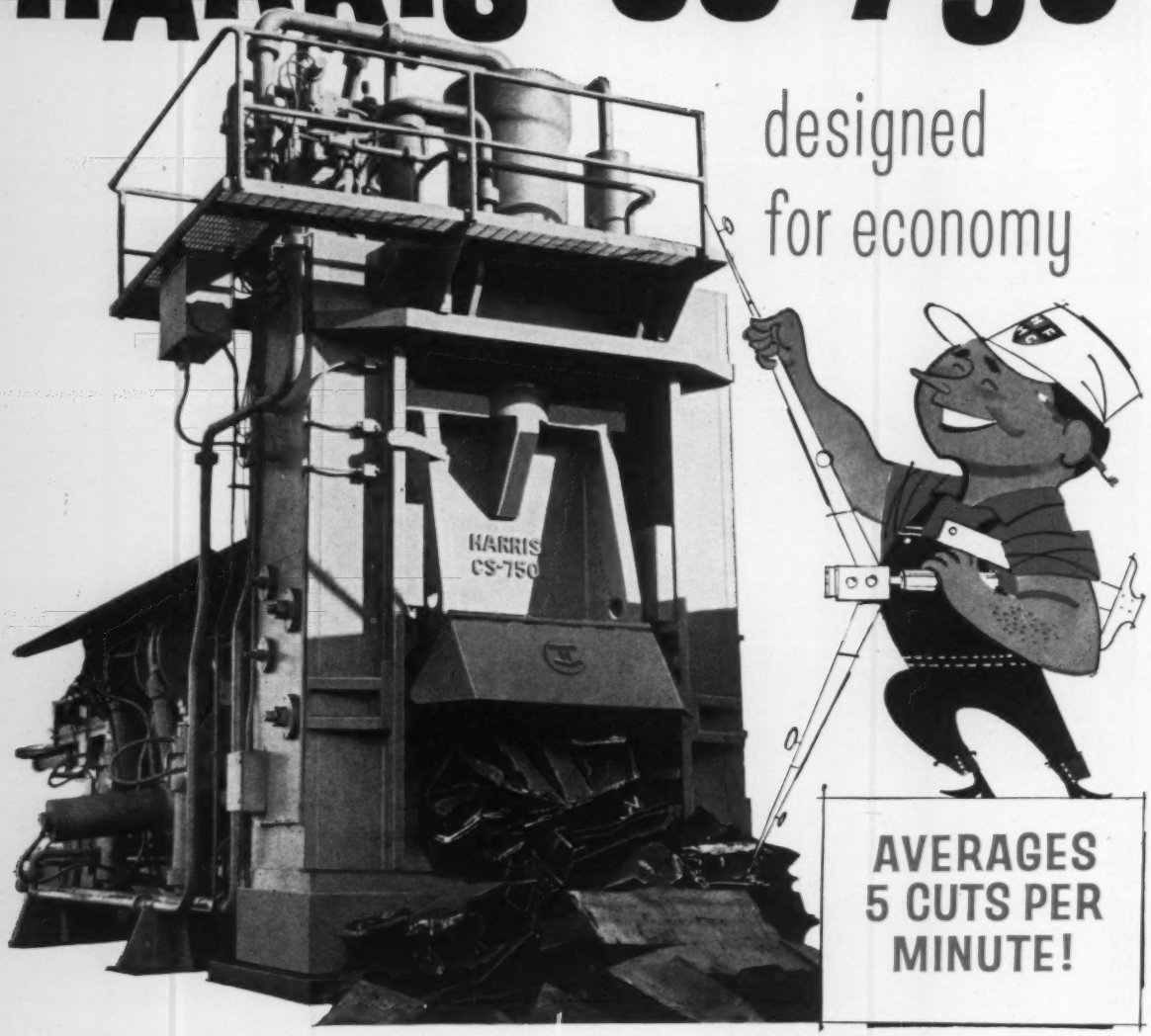

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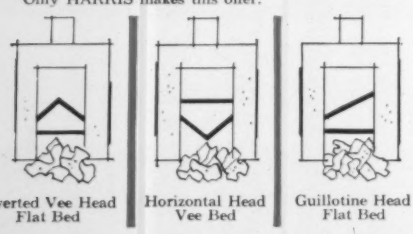

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Steel Price Hike? Not Yet

THE ODDS are against a steel price increase on Dec. 1, when industry wage rates go up an average of 8.4 cents an hour and total employment costs may advance as much as 13 cents an hour.

Major producers reluctantly agree the market will not support a price increase at this time. They are caught in a squeeze between rising costs and a weak demand.

But a price increase is sure to come as soon as market conditions warrant. The only questions are: The effective date, the amount, and which company will make the first move.

Chances are there will be no across-the-board increase initiated by the largest producer—U. S. Steel.

PREDICTION— More likely, a smaller steel producing company which is exceptionally hard pressed financially will make the first move on base prices of selected products. Other companies will follow suit. The pattern will be duplicated numerous times, as additional steel products come in for an upward adjustment.

RESTRAINTS— In view of the lagging demand for steel, competition from other materials and imported steel, and political considerations, price increases will probably be restricted to around $3 to $4 a ton. Prices of steel products under strongest competition from imports may remain untouched.

Some people think the industry made a mistake when it didn't raise prices early in the year. Third quarter earnings of iron and steel companies averaged only 3.4 per cent of sales. Several steelmakers lost money; several others failed to cover their common stock dividends. Fourth quarter results will be worse if nothing is done to offset the Dec. 1 employment cost increases.

SELECTIVE INCREASES?— Because profits per ton and shipments are abnormally low, producers feel a need for higher prices. But competition from other materials and imported steel is one of the important brakes on higher prices. For that reason, some observers predict that there will be no across-the-board move. The tonnage products (carbon sheets, bars, plates, and shapes) could best stand an increase, they believe. Items that couldn't are: Tin plate, electrical sheets, barbed wire, nails, welded tubing, reinforcing bars, stainless products, and tool steels.

Consumers have done little hedging against an increase. They've been trying for months to minimize their inventory costs.

OUTLOOK FOR 1961— Next year's steel consumption may be slightly less than this year's, predicts William A. Steele, president of Wheeling Steel Corp. He believes inventory adjustments will be completed by the middle of 1961 and that an upturn in residential building, combined with a continuing high level of commercial and public construction, may offset a moderate decline in private capital spending.

STEELMAKING OFF— Production this week will come back only part way from the low point to which it dropped in last week's Thanksgiving holiday period. Operations, dropping 4.1 percentage points last week, moped along at 47.5 per cent of capacity, yielding about 1,352,000 net tons of ingots. Part of the drop came from time out for Thanksgiving Day observance, but some stemmed from shutdown of facilities until steel demand picks up.

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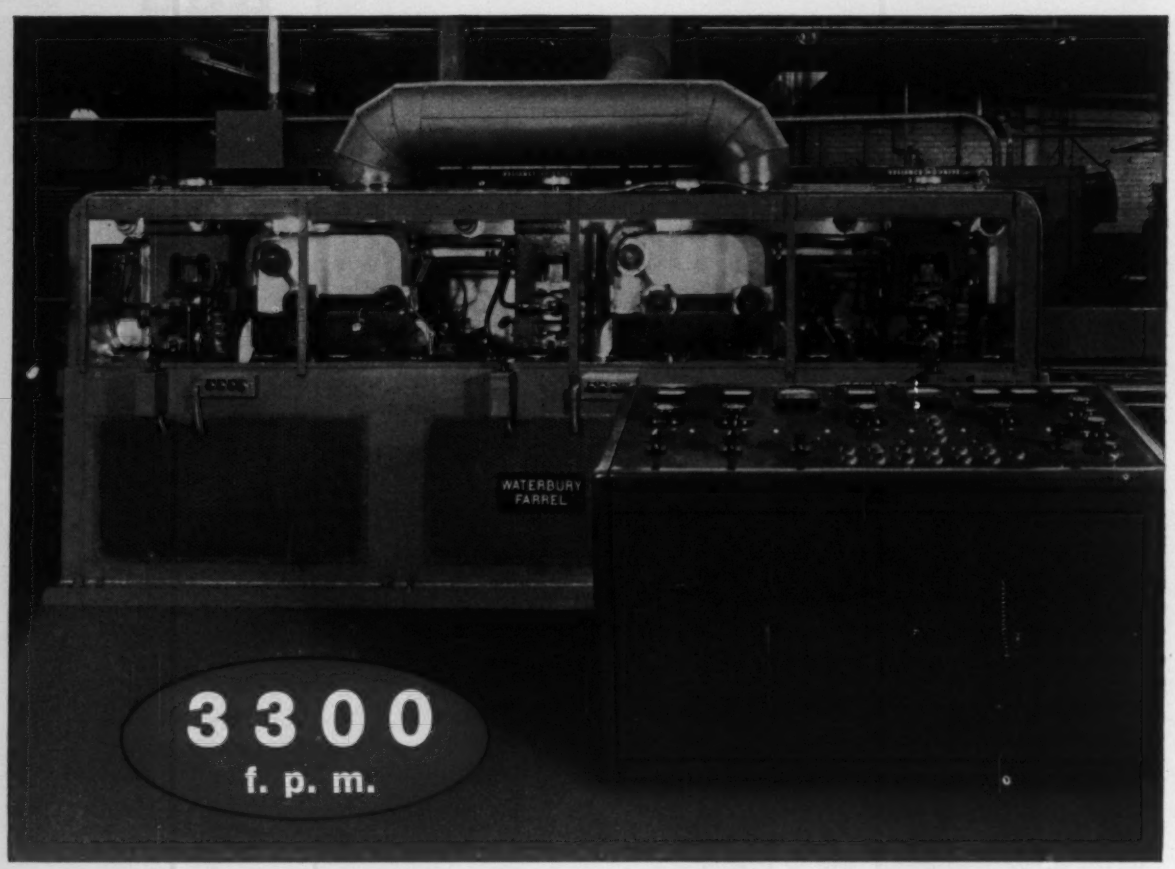

PRECISION *Wire Flattening* MILLS

THE WATERBURY FARREL 3-STAND TANDEM WIRE FLATTENING MILL, pictured above, is rolling close tolerance, high carbon steel wire at the Athenia Steel Div., National-Standard Co., Clifton, N. J., *at speeds up to 3300 feet per minute.* Tolerances are being held within 0.002" on width and 0.00025" on thickness of finished rectangular wire. Modern, cabinet type enclosure of the mill and its coolant troughs keeps the installation clean and facilitates the exhausting of fumes and evaporated coolant.

We invite you to contact us for your requirements in rolling mill equipment. In addition to Wire Flattening Mills, we design and build Sendzimir Cold Strip Mills, Two-High and Four-High Mills, Two-High/Four-High Combination Mills, Rod Mills, Special Mills, Gang Slitters, and Accessory and Auxiliary Equipment.

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WF-72

Suppliers Wary of 1961

(Production in thousands of pounds)

	Electrodes	Electrodes & Wires
1961*	475,000	540,000
1960*	490,000	550,000
1959	597,386	663,821
1958	423,217	457,239
1957	562,020	627,438
1956	637,576	677,058
1955	571,285	604,388

*Estimated by STEEL.
Source: Welding Engineer.

Long Term Uptrend Seen by Welding Electrode Makers

PRODUCTION of welding electrodes could show an appreciable pickup in early 1961 and still fall short of the 1960 totals. (See table above.) Reason: The upturn would start from such a low level that many makers doubt that it could gather enough momentum to overcome the extremely high production rates in the early part of this year.

But not all is gloom in the industry. New applications of welding are continually increasing the potential for electrodes once the general economy gets back on the upward path.

• **Wire Output to Double**—Continuous electrode (wire) arcwelding is one of the most rapidly growing applications, some industry officials feel. Says an official of Linde Co., a division of Union Carbide Corp.: "Processes employing inert gas shielding (with argon, helium, carbon dioxide) are now showing dramatic growth in mild and alloy steel welding, using both bare and lightly coated wires. Also, processes employing flux coated or flux cored wires for steel welding show definite signs of significant growth in the next few years. We expect that usage of steel welding wire will nearly double in the next five years."

• **Divided Opinion**—But makers of electrodes have to live with current business, and right now it isn't so good. It has been slipping since early in the year, and W. E. Claflin, manager of the Weldrod & Wire Dept., Ampco Metal Inc., Milwaukee, thinks that November and December will follow that trend. Producers say that the major drop this year has been in mild steel electrodes, mainly because of a lag in shipwork, farm and road building equipment, heavy construction, and steel mill requirements.

When it comes to 1961, opinion varies, however. Mr. Claflin expects an increase during the first part of the year as customer and distributor stocks near bottom. R. W. Raney, general sales manager, Welding Products Div., A. O. Smith Corp., Milwaukee, describes the outlook as "good to very good" for the first quarter. J. S. Roscoe, executive vice president, Lincoln Electric Co., Cleveland, looks for electrode sales in 1961 to be "somewhat better" than those in 1960, with the largest potential centered in the structural field—both buildings and bridges and the industries associated with road building. But he believes the current quarter will be below the average of the first three quarters of this year. Some expect an upturn sometime during the year, but feel it won't come until the second half.

On the other hand, one large company in the industry is expecting a decline in electrode sales (not including wire) next year of about 13 per cent under the depressed 1960 total of 490 million lb. Others are "inclined to agree" on the direction but differ on the magnitude of the decline.

Linde officials look for about 30,000 tons of steel to be processed into wire for continuous electrode arcwelding, which will be slightly under the 1959 tonnage. But they look for requirements in 1961 to be a little over 32,000 tons.

• **Long Term Favorable**—However, over the long term, trends favor the industry. Increasing applications of high strength steels are requiring new types of electrodes, including the metal powder coated types, one large producer points out. (Lincoln Electric's Mr. Roscoe thinks that re-

finements in existing designs of manual electrodes will continue, especially through the use of iron powder coatings.)

Increasing applications for stainless electrodes are being found in dairy and papermaking machinery and in areas of atmospheric corrosion resistance.

Linde says that more than 80 per cent of total steel welding wire is now used for submerged arcwelding and that the process is still expanding at a good rate. In addition, company officials say that during the last five years a number of new, wire consuming, welding processes have been introduced.

Indicative of the widening markets is the growing variety of electrodes available. Air Reduction Sales Co., New York, for instance, is offering at least 96 types and 421 separate sizes and designs, and the end is not in sight.

• **Prices Firm**—Prices on a metal powder type of stainless steel electrode have been recently reduced, but in general, prices have held fairly steady. Little change is in prospect for six months to a year.

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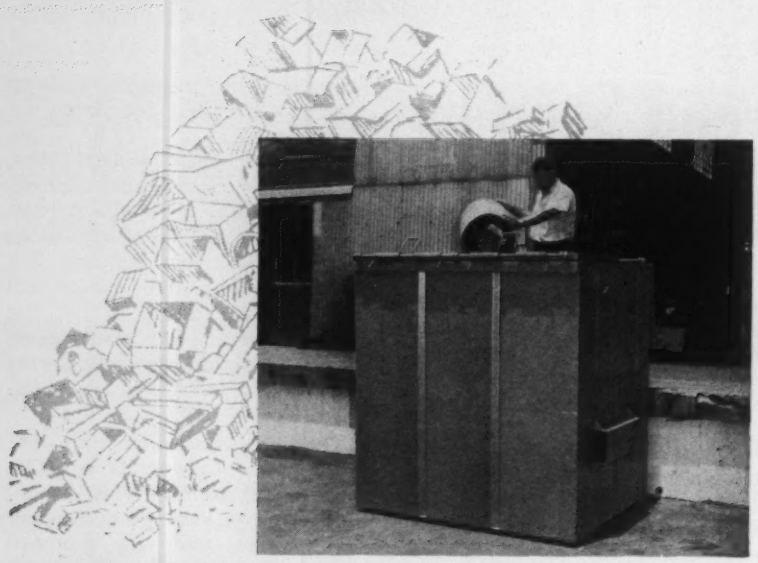

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Chicago's Steel Imports Rise Sharply in October

Steel imports at the port of Chicago via the St. Lawrence Seaway in October totaled 12,319 tons, up sharply from the 7310 tons that came in during September, reports the Chicago Association of Commerce & Industry. In October, 1959, the tonnage was 22,598.

Imports in the first ten months this year totaled 65,415 tons, a 66 per cent decrease from the 190,260 tons that were imported in the comparable 1959 period.

Of the October total, wire rods accounted for 31.8 per cent; bars, 27.5; structural steel, 16; wire and wire products, 13.4; pipe and tubing, 6.3; nuts, bolts, screws, and washers, 2.6; rails, 1.2; sheets, 0.4; barbed wire, 0.3; and miscellaneous, 0.5.

Of the items imported, 63.1 per cent came from Antwerp (Belgium), while Rotterdam (the Netherlands), accounted for 18.9, Bremen (Germany), 2.7, Genoa (Italy) 2.6, Swansea (England) 2.3, LeHavre (France) 2.2, Manchester (England) 1.9, Hamburg (Germany) 1.7, Gothenburg (Sweden) 1.6, Glasgow (Scotland) 1.4, Liverpool (England) 0.8, London 0.5, and Marseilles (France), Naples (Italy), and Rijeka (Yugoslavia), each 0.1 per cent.

Through October, imports were divided this way: Wire rods, 30.6 per cent; structural steel, 23.4; wire and wire products, 14.6; bars, 13.9; nuts, bolts, screws, and washers, 6.3; pipe and tubing, 6.1; sheets, 2.8; barbed wire, 0.9; rails, 0.8; plates, 0.3; miscellaneous, 0.3.

Tin Plate . . .

Tin Plate Prices, Page 155

Demand for tin plate continues to decline. It is expected to move slowly through December. A substantial pickup is likely in January and subsequent months. There's no indication of a price boost. At one time, producers guaranteed tin plate prices for a year. Later, it was possible to make adjustments

on Jan. 1 or June 1, upon 35 days' notice. Currently, prices can be revised at any time after the 35 days' notification.

Warehouse Share of Steel Shipments Leads in 1950s

More than 710 million net tons of finished steel products were shipped by the mills into domestic markets during the 1950s, reports the American Iron & Steel Institute. That was the highest 10 year total in history. The largest share of the tonnage, 139 million tons, went to warehouses and distributors, followed by the automotive industry with 136 million, and construction and contractors' products with 128 million.

Shipments to other major markets in the period were: Containers, 63 million tons; machinery (including electrical) and industrial equipment and tools, 61 million; steel for processing, forging, fasteners, 58 million; appliances, utensils, cutlery, and other domestic and commercial equipment, 37 million; rail transportation, 37 million; agricultural, 13 million; all other domestic markets, 38 million.

Distributors . . .

Prices, Page 158

Distributors are writing off 1960 as one of the slowest years experienced since 1949. They hold little hope for improvement in bookings before start of the new year. Some observers are skeptical of much gain in volume during the first quarter.

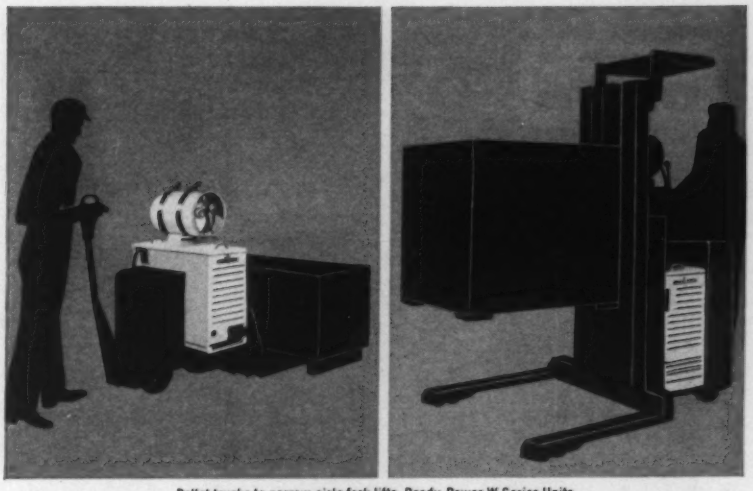
Service centers have an oversupply of practically all products, based on current demand, but on the basis of normal tonnages in recent years, stocks are considered well balanced and not excessive.

On the West Coast, price concessions are reported by some suppliers still holding imported steel in stock.

Steel Bars . . .

Bar Prices, Page 153

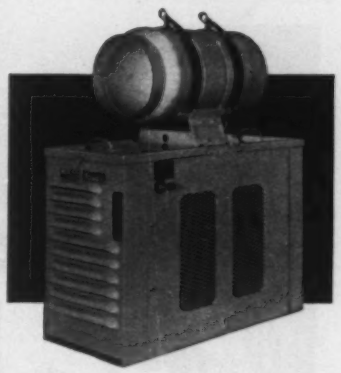
Demand for hot rolled bars is slow. Tonnage is going to a variety of consuming fields. Forging requirements, converter and railroad equipment specifications are on the down side. Shipbuilding needs are up a little; and some lines of ma-



Pallet trucks to narrow-aisle fork lifts, Ready-Power W Series Units provide full-time power for all types of material handling vehicles.

Compact W Series Ready-Power Unit Assures Full-Time Electric Power for Small Rider and Walkie Trucks

You always get full power from small-size material handling trucks equipped with Ready-Power's W Series Power Unit. Generating its own electric power as it is needed, the W Series can operate continuously at top capacity. There is no power fatigue, no letdown.



Ready-Power W Series Units are designed to fit practically any make of electric walkie and small rider-type trucks. The compact units are easily installed or interchanged. A new 12 volt automotive-type starting and ignition system assures quick starts. Top cover and end plate are easily removed for quick accessibility to engine and controls. The unit can be equipped with either gasoline or LP-Gas fueling systems.

Ready-Power offers a complete range of dependable engine/generator power units for all makes and models of electric trucks . . . from walkies to industry's largest ram and die handlers utilizing Ready-Power diesel electric models. Mail coupon below for information.

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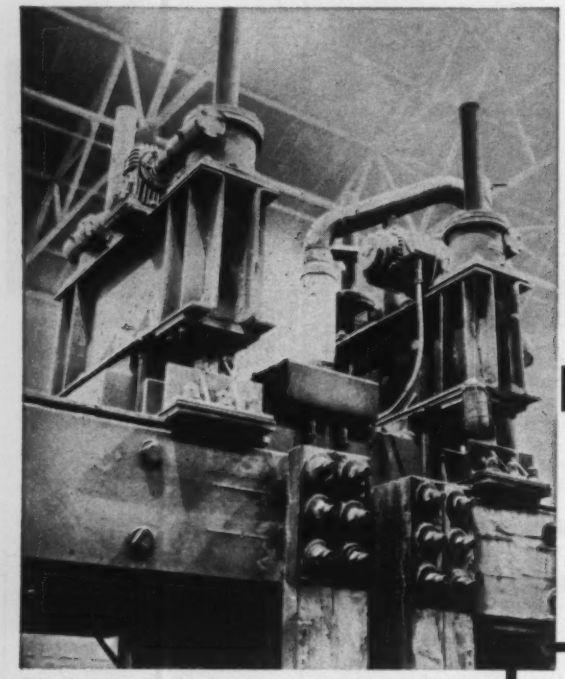
Added capacity at lower cost

Putting standard Delta 11" metalworking lathes on the job expanded the capacity of the lathe department at the Armaments Division of Universal Match Co., St. Louis, at surprisingly low cost. And, according to shop men, the Delta lathes work right alongside—and keep up with—costlier, heavy duty equipment. In addition to lowering initial tool investment, Delta lathes provide savings in set-up and operating time and greatly reduced maintenance.

This is another example of how thousands of metalworking plants are using rugged, versatile and highly accurate Delta Industrial Tools to supplement or replace special purpose machines. Write for free, 64-page illustrated booklet of cost cutting ideas: Rockwell Manufacturing Company, Delta Power Tool Division, 638L N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Guelph, Ont.



100 million pounds per year

That's how much aluminum a modern reduction plant equipped with 1000 Cone-Drive **double-enveloping worm** gearmotors produces. Gearmotors control anodes and casings on the electric furnaces. Ambient temperatures to 300° F and constant reversing are encountered.

Versatile Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

chinery and processing equipment are a little more active than they were. Cold drawers, who distribute much of their tonnage through steel service centers, report a continued lag in demand.

Deliveries remain easy at four weeks on hot rolled carbon bars and three to five weeks (depending on processing) on hot alloy bars. Cold drawn carbon bars are available from stock to three weeks. Schedules on cold drawn alloy bars are a little more extended, while tool steels can be had from stock in a wide range of analyses.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 154 & 155

While sheet steel is moving at a better rate than other major products, business continues to be disappointing and shows few signs of early improvement. Producers say that once business starts upward, however, it will improve at a rapid rate because consumer stocks are low, and any shift that tightens mill deliveries will undoubtedly accelerate buying. Such a shift could come from price hedge buying. At present, though, there are no signs of protective covering. Deliveries on all grades are easy.

"Our customers aren't asking us about the possibility of higher prices, and they don't seem to be hedging," says the chief sales executive of one large Ohio mill. "If there were any speculative buying, I think we'd know about it. The industry's operating rate would certainly be at a higher level."

Users are buying less metal than they're using—taking up to 20 per cent of their requirements from inventory. Automotive demand continues at a good, steady level, but other markets are depressed. There are no signs of a pickup in buying by appliance manufacturers.

Summing up: November is shaping up like October did—with little change from the previous month's bookings, production, or shipments. The outlook for December: More of the same.

Delivery promises on all steel products are at the minimum. It is said delivery time won't lengthen until steel operations rise to 75 per cent of capacity or higher. Hot rolled and galvanized sheets are

available for shipment in two to three weeks, cold rolled and electrical sheets in three to four weeks.

Tubular Goods . . .

Tubular Goods Prices, Page 157

The market for tubular goods is weak, but producers are hopeful business will improve next quarter. Sales of oil country goods are up one week and down the next. Customers who've been out of the market for months are starting to buy again; apparently, they've reduced inventories as much as they dare. Most of the new buying is of such items as 4½ in. casing and 2⅜ to 2-7/8 in. tubing.

Line pipe is in a slump, following fairly active demand this fall. The slower market pace reflects completion of old orders and a dearth of new ones. The 1961 outlook is said to be favorable, however. Several large gas transmission projects are pending.

Cast iron pipe is inactive. Spring requirements are expected to come out for bids in 30 days or so.

The latest weekly survey by the Hughes Tool Co. shows 1963 rotary oil drilling rigs operating in the U. S. and Canada, an increase of 92 from the previous survey. The U. S. total was 1812, up 80, and Canada, 151, up 12.

Plates . . .

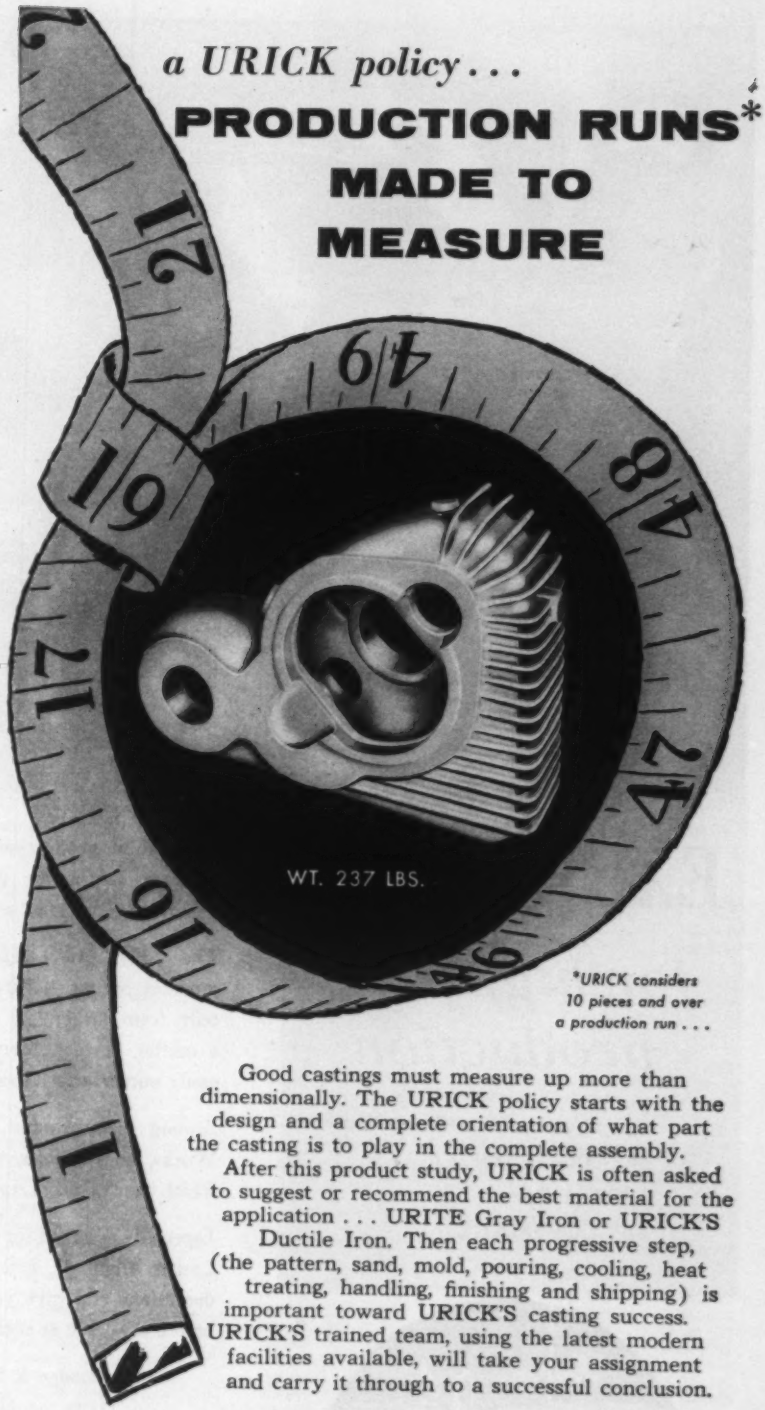
Plate Prices, Page 153

Plate business continues to lag, and producers don't anticipate an early pickup. Building construction needs are fairly well sustained, and there is a slight gain in shipbuilding specifications, but tank and boiler work is off, and fabricated pipe and railroad requirements are coming out slowly. Heavy industrial equipment is resulting in some inquiry for estimating purposes, but is not presently accounting for much in the way of actual buying. Steel service centers are exerting little pressure for tonnage.

Builders of heavy electrical equipment report a pickup in inquiries which they hope foreshadows better business. Water wheel generator orders are holding up better than bookings in the turbine generator field. The market for motors and switchgear apparatus is soft; prices are depressed.

a URICK policy . . .

PRODUCTION RUNS* MADE TO MEASURE



**URICK considers 10 pieces and over a production run . . .*

Good castings must measure up more than dimensionally. The URICK policy starts with the design and a complete orientation of what part the casting is to play in the complete assembly. After this product study, URICK is often asked to suggest or recommend the best material for the application . . . URITE Gray Iron or URICK'S Ductile Iron. Then each progressive step, (the pattern, sand, mold, pouring, cooling, heat treating, handling, finishing and shipping) is important toward URICK'S casting success. URICK'S trained team, using the latest modern facilities available, will take your assignment and carry it through to a successful conclusion.

Contact URICK, the foundry that starts with "U" and stays with you. Write for advanced technical data about URITE gray iron castings.

URITE CASTINGS

URICK FOUNDRY

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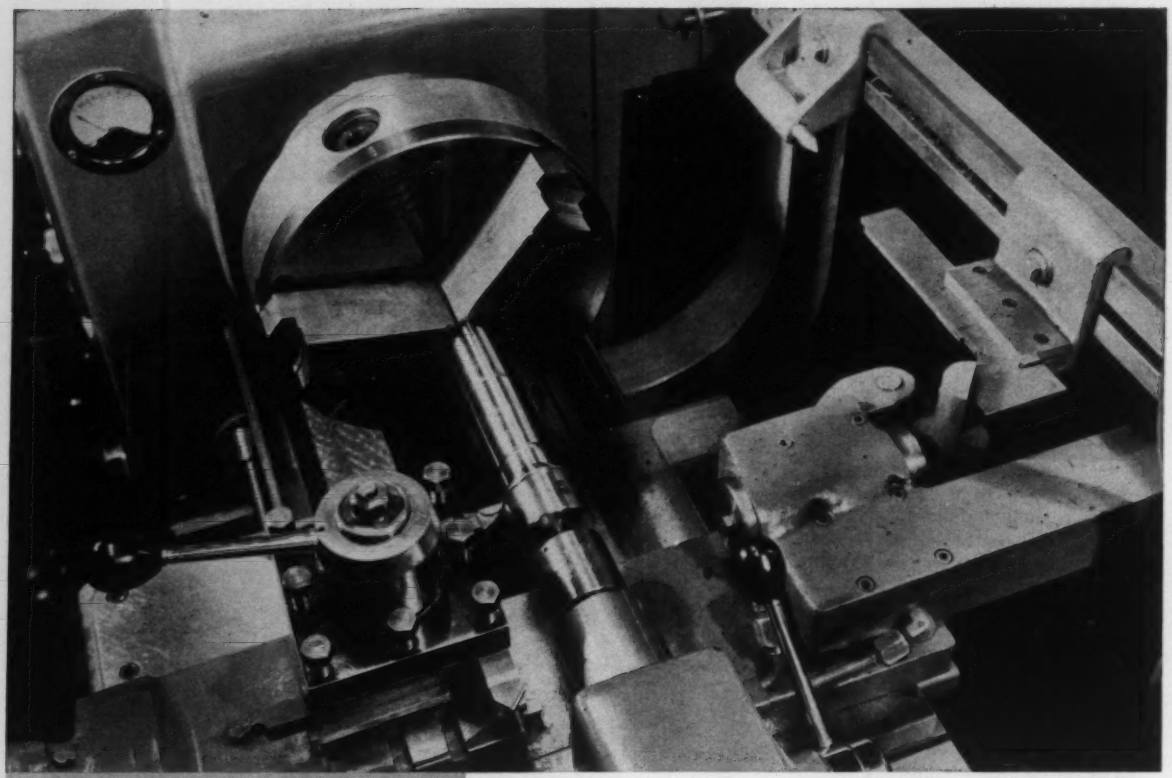
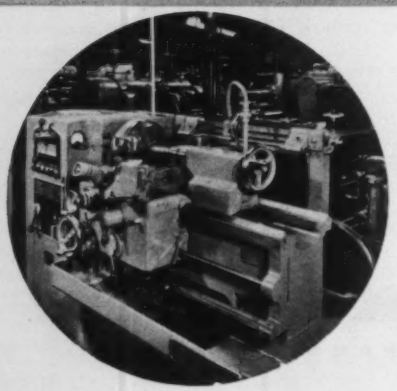


EXCELLENT

for high production

. . . says Indiana Gear Works of LODGE & SHIPLEY 1307 Hi-Turn 45° COPYMATIC



If you think production turning requires a big, costly tracing lathe to assure fine part finish, long tool life and close tolerances . . . here's a new slant on the subject.

The 1307 (10") Hi-Turn 45° COPYMATIC Lathe provides output, accuracy and versatility formerly available only from larger, far more expensive automatic lathes. As a matter of fact, users report these tracer-controlled lathes easily outperform lathes costing twice as much.

Among many Lodge & Shipley Lathes, at Indiana Gear Works, Indianapolis, you'll find Hi-Turn COPYMATICS which have earned a reputation "excellent for high production."

Especially designed for turning, boring and facing the Hi-Turn Lathes eliminate details unessential to production turning operations and give you capacity, accuracy and speed never before available at such low cost. For complete details, write:

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SEE OUR CATALOG IN SWEET'S

Equipment makers are still trimming their steel stockpiles. One company's inventory targets for shapes and plates are 20 to 30 per cent lower than they were last spring.

Machinery builders are betting against a steel price increase in December. In one buyer's opinion, the odds on a January price hike are about 50-50. If there's an increase, he says, it will run perhaps $2 to $3 a ton.

The Pennsylvania Railroad will build 350 freight cars, costing more than $28 million, at its Altoona (Pa.) Works.

Shipments on sheared plate range 10 days to three weeks, and on alloy plate, two to five weeks. Relatively, there's more business in the plate specialties than in carbon plate, due to demand from the oil and chemical industries.

Stainless Steel . . .

Stainless Steel Prices, Page 157

Demand for stainless steel was sluggish in September, the latest month of record. Shipments during the month came to 41,964 net tons—4004 tons semifinished products, 3264 tons shapes and plates, 6564 tons bars and tool steel, 1658 tons pipe and tubing, 1576 tons wire and wire products, and 24,898 tons sheets and strip.

The total movement for September, 1959, was 21,846 tons—because of the steel strike.

Shipments in the first nine months this year totaled 452,474 net tons, off slightly from the 466,584 moved in the like period last year.

Armco Steel Corp., Middletown, Ohio, has established itself as the owner of two trademarks (Armco 17-4 PH and Armco 17-7 PH) for chrome-nickel, precipitation hardening stainless steels. The decision was made in Federal District Court, Washington.

Rails, Cars . . .

Track Material Prices, Page 156

The Delaware & Hudson Railroad plans to lay more than 40 miles of continuous welded rails during 1961. The 1476 ft lengths will be placed on the Pennsylvania and Susquehanna subdivisions. The rail will be recovered from tracks that have been put out of service through centralized train control. Welding will be done at the Oneonta, N. Y., yards. About 500 gondolas will be required to transport the track to and from Oneonta.

To produce sound welds, the ends of the rail, presently drilled for bolts, will be cut off. About 600 tons of scrap will be generated.

The Louisville & Nashville Railroad has ordered 1800 freight cars (cost, $19.5 million) from the Bessemer, Ala., plant of Pullman-Standard for early 1961 delivery. The new units will consist of 900 coal hopper cars and 900 general purpose gondolas. All the cars will have 70 tons of capacity. They'll be equipped with roller bearings.

Ferguson Gets Contract

National Steel Corp., Pittsburgh, has awarded the general contract for construction of a basic oxygen steelmaking shop with an annual capacity of 2 million ingot tons (STEEL, Aug. 22, p. 68) to H. K. Ferguson Co. Inc., Cleveland. The shop will be constructed at the Detroit plant of National Steel's subsidiary, Great Lakes Steel Corp. Construction will start in the first quarter of 1961 and initial operation is scheduled for the summer of 1962.

Structural Shapes . . .

Structural Shape Prices, Page 153

Recent slack structural steel inquiry is being taken up in part by substantial work for New York State, where bids will be opened Dec. 5 on bridgework requiring 20,930 tons of shapes and 12,000 to 13,000 tons of reinforcing steel.

Featured in this work is the rebidding of a Kings County project involving 9318 tons of shapes, with the state adding $700,000 to its appropriation for the job.

In general, orders are spotty, and while fabricated material prices are a little firmer (reflecting a profit squeeze at various plants), competition is still severe. Most fabricators, particularly the smaller shops, will have to scratch for tonnage between now and early spring, when an upturn in demand is expected.

The State of Vermont has plans ready on 7150 tons for bridges. Of

Shipments of Steel Products—September, 1960

(Net tons; all grades)

Products	Carbon	Alloy	Stainless	Total	First Nine Months 1960
Ingots	13,613	8,862	1,677	24,152	279,455
Blooms, slabs, etc.	55,375	22,569	1,427	79,371	1,164,573
Tube rounds	945	233	2	1,180	13,972
Skelp	4,612	.....	.....	4,612	93,528
Wire rods	68,226	1,510	898	70,634	738,108
Structurals	288,465	5,144	17	293,626	3,844,129
Steel piling	30,558	4	.....	30,562	330,456
Plates	332,567	37,391	3,264	373,205	4,964,788
Rails (standard)	16,967	.....	.....	16,967	604,495
Rails (all other)	2,847	.....	.....	2,847	37,918
Joint bars	1,218	.....	.....	1,218	23,788
Tie plates	2,506	.....	.....	2,506	114,456
Track spikes	2,664	.....	.....	2,664	39,615
Wheels	17,397	55	.....	17,452	200,352
Axles	7,521	22	.....	7,543	91,548
Bars (hot rolled)	353,024	109,108	3,084	465,216	5,575,198
Bars—reinforcing	208,312	.....	.....	208,312	1,661,265
Bars—coldfinished	69,023	15,763	3,480	88,266	1,141,582
Tool steel	615	5,128	.....	5,743	69,392
Standard pipe	167,106	133	.....	167,239	1,694,022
Oil country goods	57,435	15,732	.....	73,167	943,312
Line pipe	228,516	23	.....	228,539	2,261,627
Mechanical tubing	34,983	16,647	473	52,103	619,989
Pressure tubing	16,722	4,126	1,185	22,033	212,946
Wire—drawn	197,398	3,041	1,574	202,013	1,920,706
Nails & staples	26,944	.....	2	26,946	259,665
Barbed wire	4,039	.....	.....	4,039	38,141
Woven fence	7,645	.....	.....	7,645	88,774
Bale ties, etc.	3,442	.....	.....	3,442	57,971
Black plate	39,929	.....	.....	39,929	470,994
Tin plate HD	28,610	.....	.....	28,610	335,439
Tin plate—electro	356,036	.....	.....	356,036	4,279,724
Sheets—hot rolled	567,234	15,995	1,275	584,504	6,471,677
Sheets—cold rolled	1,014,293	2,445	9,170	1,025,908	11,695,153
Sheets—galvanized	215,351	5	.....	215,356	2,483,713
Sheets (other)	20,589	.....	.....	20,589	208,159
Elec. sheets—strip	2,689	37,747	.....	40,436	455,237
Strip—hot rolled	87,735	1,146	124	89,005	1,056,915
Strip—cold rolled	84,011	1,273	14,329	99,613	1,070,043
Total (1960)	4,637,162	304,102	41,964	4,983,228	57,612,825
Total (1959)	1,148,180	112,638	21,846	1,282,664	54,939,267

Data from American Iron & Steel Institute

the total, about 2400 tons are for welded girders and the remainder wide flange composite structures. While bridge estimating is off temporarily in New England, tonnage for educational structures holds steady, and urban redevelopment will take substantially more tonnage next year.

Structural shops are quoting tonnage for delivery and erecting in the first and second quarters of 1961, and while prices appear to be a little steadier, plain material costs are not fully reflected in quotations.

Plain material deliveries are easy; shapes are available within two to four weeks, depending on rolling schedules.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1000 tons, Cross Bronx Expressway, FICBE 60-4, New York, through Slattery Contracting Co. to Schacht Steel Construction Inc., New York.

800 tons, St. Charles Hospital, Port Jefferson, N. Y., to Grand Iron Works, New York.

525 tons, building, Long Island Graduate Center, Farmingdale, N. Y., for Polytechnic Institute, Brooklyn, N. Y., through William J. Barney, general contractor, to Schacht Steel Construction Inc., New York.

400 tons, Spring Valley powerhouse, near Redding, Calif., to Pacific Car & Foundry Co., Seattle; Scheumann & Johnson, Seattle, general contractor.

400 tons, Cornell University library and research building, York Avenue, New York, through Vermilya-Brown Inc., general contractor, to Schacht Steel Construction Inc., New York.

300 tons, six story apartment, Pelham Bay Parkway, Bronx, N. Y., to Grand Iron Works, New York.

200 tons, Greek Orthodox Church, Brooklyn, N. Y., to Grand Iron Works, New York.

STRUCTURAL STEEL PENDING

2245 tons, two welded girder bridges, South Burlington-Winooski, Vt., 1-89-3 (10), contract 7; also, 695 tons of reinforcing bars.

2100 tons, state bridgework, Route 95, Sec. 1-G, Bergen County, New Jersey, bids Dec. 15; also, 767 tons of reinforcing steel.

1403 tons, one, three span, plate girder bridge and one, three span, composite WF, beam bridge, Richmond-Williston, Vt., 1-89-2 (9) contract 1, preliminary site inspection for later bids; also, 304 tons of concrete reinforcing bars.

500 tons or more, also 180 tons of reinforcing bars, Idaho 1229 ft Clearwater River bridge; W. R. Cahoon Construction Co., Pocatello, Idaho, low at $627,399.

492 tons, six, WF composite, beam bridges, Winooski, Vt.; preliminary inspection for later bids; also, 282 tons of reinforcing bars.

411 tons, three beam bridges, Chester, Vt., preliminary inspection for later bids; also, 123 tons of concrete reinforcing bars.

364 tons, two, WF composite, beam bridges, South Burlington, Vt., 1-189-3 (10) contract 5; preliminary inspection for later bids; also, 152 tons of reinforcing bars.

352 tons, three, WF composite, beam bridges, South Burlington, Vt., contract 3 (1-89-10), preliminary inspection for later bids; also, 22 tons of concrete reinforcing bars.

306 tons, three, WF composite, beam bridges, South Burlington, Vt.; preliminary inspection for later bids; also, 138 tons of concrete reinforcing bars, and 48 tons of plate pipe.

304 tons, two composite beam bridges, Derby, Vt.; also, 122 tons of concrete reinforcing bars; preliminary inspection for later bids.

250 tons, six, WF composite bridges, South Burlington, Vt., 1-189-3 (11), preliminary inspection for later bids; also, 185 tons of reinforcing bars and 75 tons of plate pipe.

208 tons, one, six span, WF beam bridge, Richmond-Williston, Vt., interstate Route 89, 1-89-2 (9) contract 2, preliminary site inspection for later bids; also, 122 tons, concrete reinforcing bars and 89 tons of steel piling.

193 tons, three, composite WF, beam bridges, Williston-South Burlington, Vt.; preliminary inspection for later bids; also, 85 tons of concrete reinforcing bars, and 48 tons of plate pipe.

172 tons, one, composite WF, beam bridge, Derby, Vt., preliminary inspection for later bids; also, 63 tons of concrete reinforcing bars.

163 tons, one, four span, WF composite, beam bridge, 1-83-3 (10), contract 6, South Burlington, Vt.; preliminary inspection for later bids; also, 71 tons of reinforcing bars, and 100 tons of plate pipe.

125 tons, one, three span, composite WF, beam bridge, Williston, Vt., contract 1-89-2 (9), preliminary inspection for later bids; also, 67 tons of concrete reinforcing bars.

115 tons, water treatment plant, Anchorage, Alaska; Alcan Pacific Co., Anchorage, low at $1,572,000.

111 tons, including reinforcing bars, one WF beam bridge, Mt. Tabor-Danby, Vt.; preliminary inspection for later bids.

100 tons, two, WF beam, composite bridges, Plymouth, Vt.; preliminary inspection for later bids.

100 tons, Eagle River bridge, Alaska; S. S. Mullen Inc., Seattle, low at $742,564 to Alaska Department of Public Works.

Unstated, three story structure, heavy construction, Hanford Works; bids to Kaiser Engineers, Richland, Wash., Dec. 8.

Unstated, oil pumphouse and radiation building, Hanford Works; bids to Kaiser Engineers, Richland, Wash., Nov. 22.

REINFORCING BARS . . .

REINFORCING BARS PLACED

300 tons, addition, Norwood Hospital, Norwood, Mass., to Northern Steel Inc., Boston; John A. Volpe Construction Co., Malden, Mass., general contractor; 60 tons of fabricated structural steel to Groisser & Schlager Iron Works, Somerville, Mass.

285 tons, radar towers, Blaine, Wash., to Soule Steel Co., Seattle; Baker & Ford, Bellingham, Wash., general contractor.

225 tons, Hill office building, Anchorage, Alaska, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Lease Co., Seattle, general contractor.

REINFORCING BARS PENDING

960 tons, state bridgework, Route 80, Sec. 5-G, Hackensack, N. J., bids Dec. 7.

767 tons, state bridgework, Route 95, Sec. 1-G, Bergen County, New Jersey, bids Dec. 15; also, 2100 tons of structural steel.

170 tons, including shapes, Umpqua National Forest, Oregon, bridge; bids to Bureau of Public Roads, Portland, Oreg., Dec. 5.

100 tons or more, two Idaho highway bridges; two projects, Benewah County, Murphy Bros., Spokane, Wash., low at $429,474; 183 ft concrete span, Idaho County; Foss & Holman, Boise, Idaho, low at $82,975.

55 tons, plus miscellaneous, Bureau of Public Roads bridge, Oregon; Durbin Bros., Eugene, Oreg., low at $280,179.

Unstated tonnage, addition to local Mountain States Telephone & Telegraph Co.; general award to Purvis Construction Co., Missoula, Mont., low at $156,527.

RAILS, CARS . . .

RAILROAD CARS PLACED

Canadian National, 25, forty ton narrow gage flatcars, to Eastern Car Div., Dominion Steel & Coal Co., Trenton, Nova Scotia.

Louisville & Nashville, 900 hopper cars and 900 general purpose gondolas, to Pullman Standard Div., Pullman Inc., Chicago.

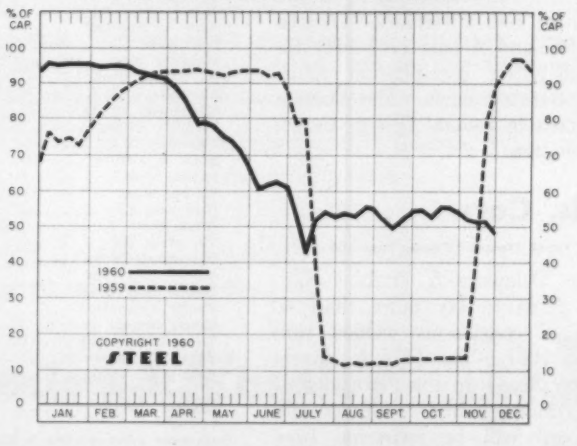
DISTRICT INGOT RATES

(Percentage of capacity utilized)

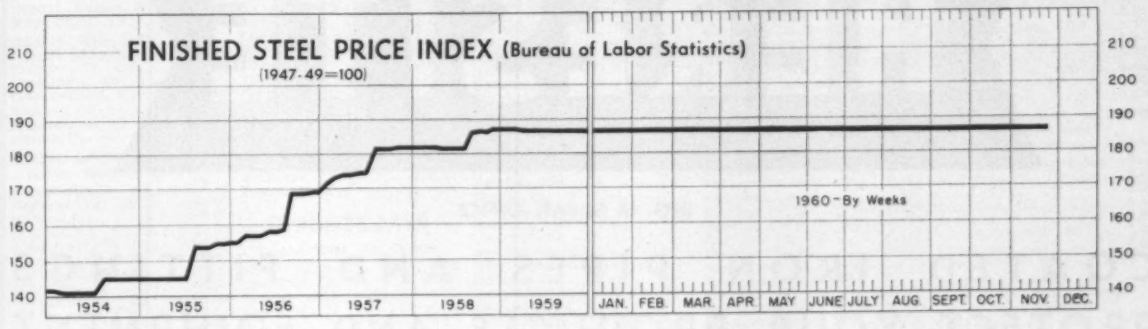
	Week Ended Nov. 27	Week Ago	Month Ago	Year Ago
Northeastern	48	54	57	99
Buffalo	47	53	60	100
Pittsburgh	45	49	48	93
Youngstown	27	38	43	87
Cleveland	55	55	57	88
Detroit	70	68	73	94
Chicago	52	53	56	86
Cincinnati	54	54	61	87
St. Louis	51	63	78	108
Southern	52	53	51	85
Western	44	48	49	78
Total Industry	47.5	51.6	54.2	89.7
Index (1947-49=100)	84.2	91.5	96.2	158.1
Net Tons (In thousands)	1,352	1,470	1,545	2,540

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Nov. 22, 1960	Week Ago	Month Ago	Nov. Index	Year Ago
186.2	186.2	186.2	186.2	186.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Nov. 22

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloys, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.335
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe, Line (100 ft)	195.430
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (bundles)	7.647
Nails, Wire, 8d Common	9.433
Wire, Barbed(80-rod spool)	8.414
Woven Wire Fence (20-rod roll)	21.008

STEEL's FINISHED STEEL PRICE INDEX

	Nov. 23 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	208.90
Index in cents per lb	6.713	6.713	6.713	6.713	5.659

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.14
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	28.83	28.83	30.17	43.50	46.33

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Nov. 23 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.97	5.97	5.97	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, 7/32-5/8" Pitts.	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton	Nov. 23 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	62.16
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	62.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$26.50	$26.50	$28.50	$41.50	$45.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	34.00	45.00	48.00
No. 1 Heavy Melt, Chicago	26.00	26.00	28.00	44.00	45.50
No. 1 Heavy Melt, Valley	26.50	26.50	27.50	45.50	48.00
No. 1 Heavy Melt, Cleve.	23.50	23.50	25.50	40.50	45.50
No. 1 Heavy Melt, Buffalo	23.50	23.50	27.50	39.50	43.50
Rails, Rerolling, Chicago	46.50	46.50	46.50	64.50	66.50
No. 1 Cast, Chicago	36.50	36.50	36.50	57.50	48.50

COKE, Net Ton

Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.00	$13.625
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	26.25

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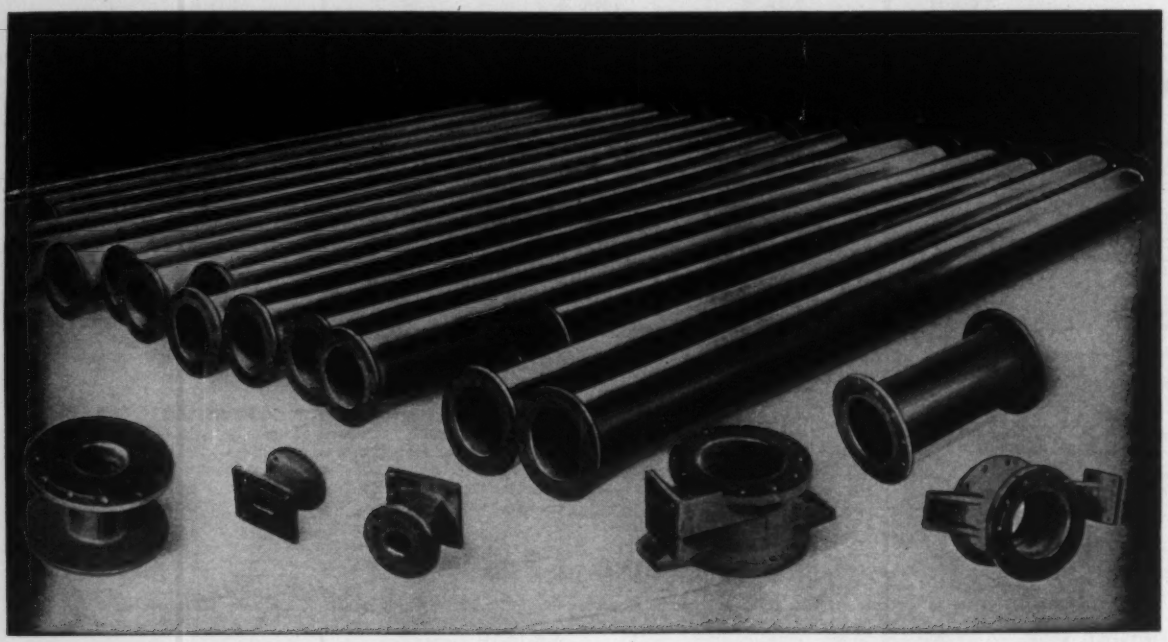
REG. U. S. PAT. OFFICE

COATED IRON PIPES AND FITTINGS PROTECT YOUR PRODUCTS AND EQUIPMENT



Many industries rely on HERESITE PURE PHENOL-FORMALDEHYDE resin lining in steel pipes and steel pipe fittings to control corrosion and commodity contamination.

Since 1942 the oil industry has used millions of feet of pipe which were lined with HERESITE to reduce corrosion fatigue.

Catalog No. 60 will be mailed if requested on your letterhead.

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Main Office & Plant—Manitowoc, Wisconsin

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Canada: Dominion Rubber Company, Ltd.
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Europe: Aluminium-Schweisswerk A. G.
Schlieren-Zurich, Switzerland

Steel Prices

Mill prices as reported to STEEL, Nov. 23, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 154; footnotes, page 156.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ....$76.00

INGOTS, Alloy (NT)
Detroit S41 ....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 ....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 ....82.00
Sharon,Pa. S3 ....82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Bartonville,Ill. K4 ..$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton,Pa. U5 ....80.00
Ensley,Ala. T2 ....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 ....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 ....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 ....80.00
Youngstown R2 ....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton,O. R2 ....102.00
Clairton,Pa. U5 ....99.50
Conshohocken, Pa.A3..104.50
Ensley,Ala. T2 ....99.50
Fairfield,Ala. T2 ....99.50
Farrell,,Pa. S3 ....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 ....99.50
Geneva,Utah C11 ....99.50
Houston S5 ....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngles B3 ....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 ....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 ....109.00
Sharon,Pa. S3 ....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 ....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 ....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 ....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 ....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 ....119.00
Houston S5 ....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 ....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 ....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 ....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 ....140.00
Sharon,Pa. S3 ....119.00
S.Chicago R2,U5,W14..119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 ....119.00
Warren,O. C17 ....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ....$122.50
Canton,O. R2 ....125.00
Cleveland R2 ....122.50
Gary,Ind. U5 ....122.50
S.Chicago,Ill. R2,W14..122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 ....122.50

SKELP
Aliquippa,Pa. J5 ....5.05
Benwood,W.Va. W10 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 ....5.05
Pittsburgh J5 ....5.05
Warren,O. R2 ....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 ....6.40
Alton,Ill. L1 ....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 ....6.40
Cleveland A7 ....6.40
Donora,Pa. A7 ....6.40
Fairfield,Ala. T2 ....6.40
Houston S5 ....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 ....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 ....6.50
LosAngeles B3 ....7.20
Minnequa,Col. C10 ....6.65
Monessen,Pa. P7 ....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 ....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 ....6.50
Struthers,O. Y1 ....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 ....5.50
Atlanta A11 ....5.70
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa. B2 ....5.55
Birmingham C15 ....5.50
Clairton,Pa. U5 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....6.30
Gary,Ind. U5 ....5.50
Geneva,Utah C11 ....5.50
Houston S5 ....5.60
Ind.Harbor,Ind. I-2, Y1 5.50
Johnstown,Pa. B2 ....5.55
Joliet,Ill. P22 ....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 ....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 ....5.50
Niles,Calif. P1 ....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 ....6.25
S.Chicago,Ill. U5, W14 ..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 ....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 ....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 ....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 ....5.50
Sterling,Ill. N15 ....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....6.90
Munhall,Pa. U5 ....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ....8.05
Bessemer,Ala. T2 ....8.05
Bethlehem,Pa. B2 ....8.10
Clairton,Pa. U5 ....8.05
Fairfield Ala. T2 ....8.05
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 ....8.05
Geneva,Utah C11 ....8.05
Houston S5 ....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 ....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 ....8.75
Munhall,Pa. U5 ....8.05
Seattle B3 ....8.80
S.Chicago, Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 ....7.75
Struthers,O. Y1 ....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 ....8.05
S.Chicago,Ill. U5 ....8.05
Sterling,Ill. N15 ....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 ....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 ....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 ....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 ....5.50
Bessemer,Ala. T2 ....5.30
Clairton,Pa. U5 ....5.30
Claymont,Del. P4 ....5.30
Cleveland J5, R2 ....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 ....5.30
Fairfield,Ala. T2 ....5.30
Farrell,Pa. S3 ....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 ....5.30
Geneva,Utah C11 ....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 ....5.30
Houston S5 ....5.40
Ind.Harbor,Ind. I-2, Y1 ..5.30
Johnstown,Pa. B2 ....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 ....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 ....5.30
Newport,Ky. A2 ....5.30
Pittsburgh J5 ....5.30
Riverdale,Ill. A1 ....5.30
Seattle B3 ....6.20
Sharon,Pa. S3 ....5.30
S.Chicago,Ill. U5, W14 ..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 ....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 ....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 ....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah, C11 ....7.05
Houston S5 ....7.15
Johnstown, Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa B14 ....14.10

PLATES, H.S., I.A.
Aliquippa,Pa. J5 ....7.95
Ashland,Ky. A10 ....7.95
Bessemer,Ala. T2 ....7.95
Clairton,Pa. U5 ....7.95
Claymont,Del. P4 ....7.95
Cleveland J5, R2 ....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 ....7.95
Ecorse,Mich. G5 ....7.95
Fairfield,Ala. T2 ....7.95
Farrell,Pa. S3 ....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 ....7.95
Geneva,Utah C11 ....7.95
Houston S5 ....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 ....7.95
Munhall,Pa. U5 ....7.95
Pittsburgh J5 ....7.95
Seattle B3 ....8.85
Sharon,Pa. S3 ....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 ....7.625
Warren,O. R2 ....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 ....7.50
Claymont,Del. P4 ....7.50
Coatesville,Pa. L7 ....7.50
Economy,Pa. B14 ....7.50
Farrell,Pa. S3 ....7.50
Fontana,Calif. K1 ....8.30
Gary,Ind. U5 ....7.50
Houston S5 ....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 ....7.50
Lowellville,O. S3 ....7.50
Munhall,Pa. U5 ....7.50
Newport,Ky. A2 ....7.50
Pittsburgh J5 ....7.50
Seattle B3 ....8.40
Sharon,Pa. S3 ....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 ....7.50

FLOOR PLATES
Cleveland J5 ....6.375
Conshohocken,Pa. A3 ..6.375
Harrisburg,Pa. P4 ....6.375
Ind.Harbor,Ind. I-2 ....6.375
Munhall,Pa. U5 ....6.375
Pittsburgh J5 ....6.375
S.Chicago,Ill. U5 ....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 ....6.05
Warren,O. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon
(Merchant Quality)
Ala.City,Ala.(9) R2 ....5.675
Aliquippa,Pa. (9) J5 ...5.675
Alton,Ill. L1 ....5.875
Atlanta(9) A11 ....5.875
Bessemer, Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 ....5.675
Canton,O.(23) R2 ....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 ....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 ....5.675
Houston(9) S5 ....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 ....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 ....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 ....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ....5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 ....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 ....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 ....6.725
Detroit S4 ....6.725
Economy,Pa. B14 ....6.725
Ecorse,Mich. G5 ....6.725
Farrell,Pa. S3 ....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 ....6.725
Houston S5 ....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngles B3 ....7.775
Lowellville,O. S3 ....6.725
Massillon,O. R2 ....6.725
Midland,Pa. C18 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 ....6.725
Seattle(6) B3 ....7.825
Sharon,Pa. S3 ....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 ....6.725
Warren,O. C17 ....6.725
Youngstown U5 ....6.725

BARS & SMALL SHAPES, H.R.
High-Strength, Low-Alloy
Aliquippa,Pa. J5 ....8.30
Bessemer,Ala. T2 ....8.30
Bethlehem,Pa. B2 ....8.30
Clairton,Pa. U5 ....8.30
Cleveland R2 ....8.30
Ecorse,Mich. G5 ....8.30
Fairfield,Ala. T2 ....8.30
Fontana,Calif. K1 ....9.00
Gary,Ind. U5 ....8.30
Houston S5 ....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 ....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 ....9.00
Pittsburgh J5 ....8.30
Seattle B3 ....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 ....7.925
Struthers,O. Y1 ....8.30
Youngstown U5 ....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 ....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 ....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ....5.675
Atlanta A11 ....5.875
Joliet,Ill. P22 ....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 ....6.375
Pittsburgh J5 ....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 ....6.52
Seattle B3 ....6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 ....6.80
Youngstown U5 ....6.80

BARS, C.F. Loaded
(Including loaded extra)
Carbon
LosAngeles P2, S30 ..11.75*

Alloy
Ambridge,Pa. W18 ..10.175
BeaverFalls,Pa. M12 ..10.175
Camden,N.J. P13 ....10.35
Chicago W18 ....10.175
Elyria,O. W8 ....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 ....8.25
Buffalo B5 ....7.70
Camden,N.J. P13 ....8.10
Carnegie,Pa. C12 ....7.65
Chicago W18 ....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 ....7.85
Detroit S41 ....7.65
Donora,Pa. A7 ....7.65
Elyria,O. W8 ....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 ....7.65
GreenBay,Wis. F7 ....7.65
Hammond,Ind. J5, L2..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 ....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ...7.65
Midland,Pa. C18 ....7.65
Monaca,Pa. S17 ....7.65
Newark,N.J. W18 ....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 ....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 ....9.10
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 ....7.65
Warren,O. C17 ....7.65
Waukegan,Ill. A7 ....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon
(Turned and Ground)
Cumberland,Md.(5) C19..8.55

BARS, Cold-finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 ....9.025
Camden,N.J. P13 ....9.20
Canton,O. T7 ....9.025
Carnegie,Pa. C12 ....9.025
Chicago W18 ....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 ....9.225
Detroit S41 ....9.025
Donora,Pa. A7 ....9.025
Elyria,O. W8 ....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 ....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. B5 ....9.025
Lackawanna,N.Y. B3..9.025
LosAngeles P2, S30 ....11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 ....9.025
Monaca,Pa. S17 ....9.025
Newark,N.J. W18 ....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20

Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Torrance,Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35

SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt) B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.)L5 ...19.80
McK.Rks.(Staybolt)L5, 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 .5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ...5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19Ga. & Lighter)

Niles,O. M21, S3 ....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 ....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. 11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ...7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide MetalsCo.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala. (27) R2 ..5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2. ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 ....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2,Y1 7.575
Lackawanna,N.Y. B2. .7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 ..7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ..7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. N8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.70	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	....	....	18.85	22.95	27.80
Buffalo W12	....	....	18.85	....	....
Fostoria,O. S1	....	....	19.05	22.15	....
FranklinPark,Ill. T6	....	....	19.20	23.30	28.15
Harrison,N.J. C18	....	....	18.85	22.95	27.80
NewYork W3	....	....	18.85	22.95	27.80
Palmer,Mass. W12	....	....	18.85	....	....
Trenton,N.J. R5	....	....	18.85	22.95	27.80
Worcester,Mass. A7, T6	....	....	18.85	22.95	27.80
Youngstown S41	....	....	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 ....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 .7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (FERROLITE)(¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55

TIN PLATE,Hot Dipped 1.25 1.50

Common Coke	lb	lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11.	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$8.20
Fairfield,Ala. T2 .....8.30
Fairless,Pa. U5 .....8.30
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 .....8.30
GraniteCity,Ill. G4 ....8.30
Ind.Harbor,Ind. I-2, Y1.8.20
Irvin,Pa. U5 .....8.20
Niles,O. R2 .....8.20
Pittsburg,Calif. C11 ....8.85
SparrowsPoint,Md. B2 ..8.20
Weirton,W.Va. W6 ....8.20
Yorkville,O. W10 .....8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 ....7.95
Ind.Harbor,Ind. Y1 ....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil, annealed; semiprocessed ½c lower. †† Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8. 8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 ....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ...8.25
Monessen,Pa. P7, P16...8.00
Palmer,Mass. W12 ....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 ....8.00
Rankin,Pa. A7 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .... 8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa. B2 ....13.40
KansasCity,Mo. U3 ...12.90
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ..12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ..13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md. B2 ...13.50
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16..9.75
NewHaven,Conn. A7 ..10.05
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 ....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ...16.55
Monessen,Pa. P16 ....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 .....13.45
Buffalo W12 .....13.45
Fostoria,O. S1 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 .....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ....13.75
(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)	
Wheeling,W.Va. W10	$10.10

POLISHED STAPLES	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Galv. Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80††
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80††
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass. W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WOVEN FENCE, 9-15 Ga.	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga. J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality (6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	9.00 9.55**
Aliquippa J5	8.65 9.325§
Atlanta(48) A11	9.00 9.75*
Bartonville(48)K4	9.85 19.90
Buffalo W12	9.00 9.55†
Chicago W13	9.00 9.55**
Cleveland A7	9.00 ....
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	9.00 9.55†
Duluth A7	9.00 9.55†
Fairfield T2	9.00 9.55†
Houston(48) S5	9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	9.00 9.55†
KansasCity(48)S5	9.25 9.80**
Kokomo(48) S16	9.10 9.65†
LosAngeles B3	9.95 10.625§
Minnequa C10	9.25 9.80**
Monessen(48) P7	8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	9.00 9.55†
S.Chicago R2	9.00 9.55**
S.SanFran. C10	9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(37)(48)N15	9.10 9.80
Struthers,O. Y1	9.00 9.65‡
Worcester,Mass.A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great. Structural ½ in., larger 12.85 7/8 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws: ¾ in. and smaller, 6 in. and shorter:

Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:

Packaged	+ 5
Bulk	19

Through 1 in. diam., longer than 6 in.:

Packaged	+29

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ⅛ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Standard All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES	
Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS	
Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES	
Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES	
Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated	
Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES	
Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) 5/16" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅜ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingot	Rerolling Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Sweepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: Carbon Base 5%	10%	15%	20%	Sheets: Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.35	43.40

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio. deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Other U. S. Districts				
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry. 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max).	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	7.77	8.66	10.06	....	8.28	8.55	11.70	16.38	9.03	8.34	10.02
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.65	9.80	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.88	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.05	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	8.83	10.46	10.50	52.00	11.11	8.86	11.01	16.23	9.47	8.78	10.94
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	9.65	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.01	10.64	10.59	....	11.18	8.99	11.09	16.39	9.35	8.85	11.12
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	8.95	11.20	11.45	61.27	10.65	9.00	14.20	17.35	9.90	8.40	11.15
Memphis, Tenn.	9.84	10.05	....	....	10.64	9.82	12.74	....	9.16	8.66	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	8.92	10.55	10.50	....	10.90	8.90	11.15	16.45	9.26	8.76	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.06
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.06
Philadelphia	8.35	9.60	10.66	52.71	10.35	8.75	11.95	16.38	8.95	8.70	9.95
Pittsburgh	8.57	9.88	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	9.45	11.30	12.35	....	11.45	9.45	16.65	17.80	10.05	9.60	11.75
St. Louis	8.77	10.58	10.53	....	10.94	8.77	11.28	16.33	9.14	8.62	10.91
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅜ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $243.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted.)

Billets, Blooms & Slabs:

Carbon (N.T.):

Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ¼ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe..36.75, ton, del. east of Mississippi.	
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron:	
90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.60
Bronze powder, 90/10.	55.20
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	58.80
Solder	8.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	24.70
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. †Depending on mesh. ‡Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.42	....	$5.32	$5.17	$5.52
Bar Size Angles	5.55	....	5.45	5.30	5.65
Structural Angles	5.45	....	5.35	5.20	5.55
I-Beams	5.45	....	5.35	5.20	5.55
Channels	5.45	....	5.35	5.20	5.55
Plates (basic besemer)	5.70	....	5.60	5.45	5.80
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	25.50	....	24.70	24.70	25.50
Barbed Wire (†)	6.25	....	6.15	6.00	6.35
Merchant Bars	5.55	....	5.45	5.30	5.65
Hot-Rolled Bands	5.85	....	5.75	5.60	5.95
Wire Rods, Thomas Commercial No. 5	6.05	....	5.95	5.95	6.25
Wire Rods, O. H., No. 5	6.25	....	6.15	6.15	6.45
Bright Common Wire Nails (‡)	6.85	....	6.75	6.60	6.95

*Book closed for 1960-61 shipping season. †Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ⅜ in. and up	12.85
Fines, under ⅜ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	23.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5% f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.75-20.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charlestown, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.80
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens:	
New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.35
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.63
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per net ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Deliveerd.

Charge Chrome: Cr 50-56%, C 6-8%, Si 4-7%, 22.00c; Cr 58-63%, C 5.8%, Si 3-6%, 22.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 63-63%, C 3-5%, Si 2.5% max, 26.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 33.50c per lb contained Cr; 0.010% max, 34.50c. Delivered.

Cr, 65-71%, carload, lump, bulk, 0.025% max, 35.00c; 0.05% max, 34.00c; 0.10% max, 33.75c; 0.20% max, 33.50c; 0.50% max, 33.25c; 1.0% max, 33.00c; 1.5% max, 32.75c; 2.0% max, 32.50c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 24.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 24.50c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down, 26.25c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ¼" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained. f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb. (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50, (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20% per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

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Load Lifter Wire Rope Electric Hoists. ½ to 15 tons. Safe 24-volts at the push-button. Single and 2-speed control. Two automatic brakes. Lug or hook suspension; also with push, hand-geared or motor-driven trolley. Hi-hook model, too.

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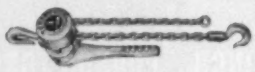
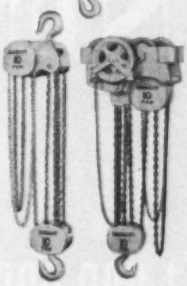
CHAIN BLOCKS

Budgit Chain Blocks. ¼ to 10 tons. Light, tough aluminum frame. 25 lb. pull on hand chain lifts 500 lbs. Fast action load brake makes lowering easy. Hook suspension or Army type trolley.

Tugit Lever-Operated Hoist. Light, compact, portable. Easy to operate even in close quarters — lifts or pulls at any angle. A fine maintenance tool. ¾ to 3 tons.





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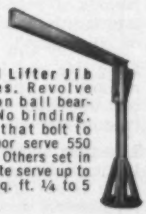
Budgit Crane Assemblies. Low-cost "build it yourself" kits to construct single girder cranes up to 6 tons and 30 ft. span without special tools. You buy I-beam locally to save more. Packaged electric bridge drive adds efficiency. Kits also for 180° swinging bracket jib cranes up to 4½ tons, 10 ft. reach.



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W4

Scrap Resists Further Price Drop

STEEL's composite on No. 1 heavy melting grade is holding firm at $28.83 for third straight week, despite sluggish demand and unpromising steelmaking trend

Scrap Prices, Page 164

• **Pittsburgh**—There may not be another test of the market until bids are closed on new automotive lists at the end of this month. Observers predict bids on No. 1 factory bundles will be lower than last month's. The flow of scrap to yards is slowing down contraseasonally. A leading producer of stainless steel says its inventory of home scrap is six times that in April.

• **Chicago**—Prices are steady but largely untested. Few steel mills are buying, and tonnages are small. With the steelmaking rate barely above 50 per cent of capacity, and some doubt existing as to whether the level can be maintained the rest of the year, requirements can be met easily by inventories and customers' returns on a contract basis. Reduced demand for castings puts ferrous foundries in the same situation as the steel mills.

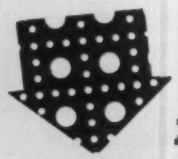
• **New York** — Brokers' buying prices are unchanged throughout the list. Exports continue to provide a stabilizing influence.

• **Philadelphia** — Though domestic demand for the major open hearth grades of scrap is slow, prices are being sustained by export trading. Two cargoes, involving 18,000 tons, are being loaded here. Prices on borings, turnings, and steel specialties are steady, with little business going to test the market. Heavy turnings are nominal at $25, delivered. In the cast iron grades, there has been a decline of $1 a ton on drop broken machinery to $47-$48, delivered.

• **Cleveland**—The market is standing still, pending monthend bids on new automotive lists. Steelmaking operations here and in the Valley are far below capacity (55 per cent at Cleveland and 27 per cent in the Valley). The mills are not showing any interest in large tonnage purchases. While dealers think prices are close to, if not already on bottom, current quotations are largely nominal.

Some foundry scrap inquiries are out, but dealers are resisting sales at the present low prices.

• **Buffalo**—No additional mill purchases of any consequence are expected the rest of this year. A sharp drop in district steelmaking operations last week put a damper on scrap trade hopes for a pickup in demand. The mills are out of the market this month and give strong indications of being out through December. Prices are nominal in the absence of new business, but they appear to have leveled off for the time being. Most observers think prices are at or close to the bottom. Cast iron scrap is



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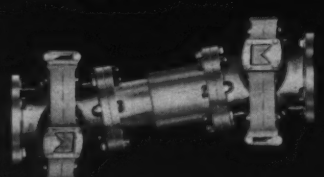

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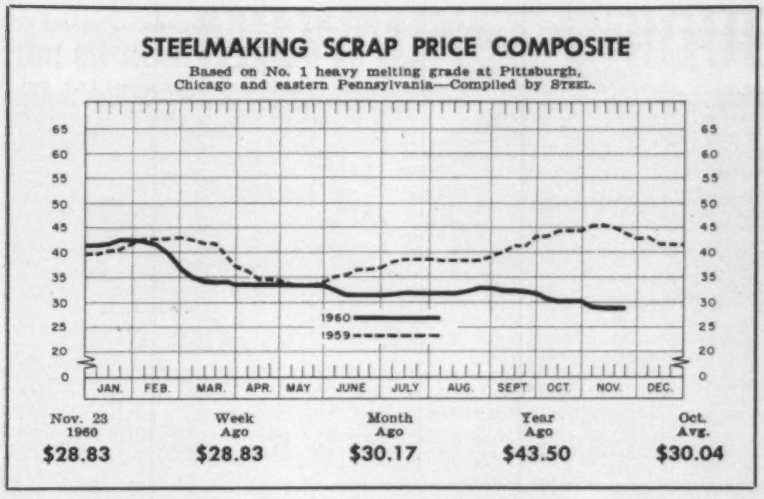

off another $1, reflecting slack foundry demand.

• **Cincinnati**—Prices are expected to hold on any new buying that's done for December delivery. Dealers expect only light purchases. They are awaiting word from one area mill that has been out of the market for three months. No. 1 heavy melting continues to be quoted $22.50-$23.50.

• **St. Louis**—Scrap is moving slowly, with demand confined to small lots. One local mill is completely out of the market, and a second has lowered its offering prices. Foundry requirements are limited.

• **Birmingham** — Demand remains spotty, and prices are weak. No. 1 heavy melting steel fell another $1 to $28-$29. Machine shop turnings are down $1 to $15-$16. Electric furnace bundles are off $2 to $28-$29. Electric furnace steel, 3 ft and under, is down $2 to $31-$32, while 2 ft material is off $1 to $33-$34. Rails (18 in. and under) are down $1 to $44-$45, and random lengths are off $1 to $38-$39.

• **Houston**—A recent series of price declines appears to have caused a slowdown in intake by district yards. Dealers describe the market situation as the slowest in years. Domestic mills are taking only small lots, and export demand is spotty.

• **Seattle** — Prices are unchanged, but weakness persists and may result in a further decline next month. Major consumers are buying sparingly.

A jurisdictional labor dispute has practically stopped export operations here. Longshoremen claim the right to handle loading equipment, a job that has been done by operating engineers. The matter is in the courts. Meanwhile, Seattle's $250,000 crane is idle, and ships have been diverted to other ports to load cargoes for Japan.

• **Los Angeles** — Sharp reductions in prices have failed to stimulate buying. A shortage of cast iron grades is developing, reflecting tight supplies of auto scrap. Collections have fallen off, but the yards are holding substantial stocks.

Pig Iron . . .

Pig Iron Prices, Page 158

Merchant pig iron demand is slow, and the trade thinks the trend will be downward the remainder of the year. Buying is largely for spot delivery. Inventories are large. Less than average anxiety over winter reserves is being shown by consumers.

Foreign trade is also quiet. Imports are negligible; exports are confined generally to shipments being made on a barter basis.

Production continues to decline. Youngstown Sheet & Tube Co. banked one more blast furnace at the Campbell (Ohio) Works. Sharon Steel Corp. suspended all basic iron and steelmaking at its Roemer Works at Farrell, Pa., for one week.

In the Birmingham district, Woodward Iron Co. continues to operate two of its four blast furnaces; Republic Steel Corp., one of two blast furnaces at its Thomas Works; and U. S. Pipe & Foundry Co., one of five blast furnaces. One pipe shop in the district has cut back operations to three days a week, while two other shops have cut back to four days a week.

Blast Furnaces Operate At 55% During October

Blast furnace production (pig iron and ferroalloys) in October totaled 4,510,819 tons, or 55 per cent of capacity, reports the American Iron & Steel Institute. It brought the total for the first ten months of the year to 59,237,360 tons, for an average of 73.4 per cent.

The October total included 38,-204 tons of ferromanganese and spiegeleisen, and the total for the first ten months was 536,114 tons.

Iron Ore . . .

Iron Ore Prices, Page 159

Only 69 vessels of the Great Lakes iron ore fleet (230 ships) were in operation on Nov. 15. That's about 30 per cent, representing 882,125 tons of trip capacity. On Nov. 15, last year, 220 ships were operating, 91.29 per cent of the total, but shippers were trying to make up tonnage lost during the steel strike.

Canadian Steel Mills Are Expecting Record Output

With steelmaking operations continuing at a high rate, expectations are the Canadian industry will establish an output record this year. In the first ten months, the mills operated at 87.5 per cent of capacity, pouring 4,900,003 tons of ingots.

That's a record for the period and an increase of 156,838 tons over output in the like 1959 period. However, output the last five months fell below that in the same period last year; a decline of 5 per cent in June was followed by a drop of 8 per cent in July, 11 per cent in August, 10 per cent in September, and 9 per cent in October.

Further declines are expected in November and December.

(*Please turn to Page* 170)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Nov. 23, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Nov. 23	$28.83
Nov. 16	28.83
Oct. Avg.	30.04
Nov. 1959	44.33
Nov. 1955	46.33

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	21.00-22.00
No. 1 dealer bundles	27.00-28.00
No. 2 bundles	20.00-21.00
No. 1 busheling	26.00-27.00
No. 1 factory bundles	30.00-31.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	11.00-12.00
Short turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut structurals:	
2 ft and under	33.00-34.00
3 ft and under	32.00-33.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	34.00-35.00
Electric furnace bundles	31.00-32.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Stove plate	32.00-33.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	34.00-35.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	29.00-30.00
Rails, 2 ft and under	46.00-47.00
Rails, 18 in. and under	47.00-48.00
Random rails	42.00-43.00
Angles, splice bars	36.00-37.00
Railroad specialties	37.00-38.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	27.00-28.00
No. 1 hvy melt., dealer	24.00-25.00
No. 2 hvy melting	22.00-23.00
No. 1 factory bundles	29.00-30.00
No. 1 dealer bundles	25.00-26.00
No. 2 bundles	16.00-17.00
No. 1 busheling, indus.	27.00-28.00
No. 1 busheling, dealer	24.00-25.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	13.00-14.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Cut structurals, 3 ft	30.00-31.00
Punchings & plate scrap	32.00-33.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Stove plate	30.00-31.00
Unstripped motor blocks	28.00-29.00
Clean auto cast	41.00-42.00
Drop broken machinery	41.00-42.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00-29.00
R.R. malleable	40.00-41.00
Rails, 2 ft and under	42.00-43.00
Rails, 18 in. and under	43.00-44.00
Angles, splice bars	37.00-38.00
Axles	48.00-49.00
Rails, rerolling	46.00-47.00

Stainless Steel Scrap

18-8 bundles, solids	160.00-165.00
18-8 turnings	90.00-95.00
430 bundles & solids	75.00-80.00
430 turnings	40.00-45.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	17.00-18.00
No. 2 heavy melting	13.00-14.00
No. 1 bundles	19.00-20.00
No. 2 bundles	10.00-11.00
No. 1 busheling	16.00-17.00
Machine shop turnings	6.00-7.00
Mixed borings, turnings	6.00-7.00
Shovel turnings	7.00-8.00

Cast Iron Grades

No. 1 cupola	28.00-29.00
Stove plate	22.00-23.00
Heavy breakable	21.00-22.00
Unstripped motor blocks	17.00-18.00
Charging box cast	23.00-24.00
Clean auto cast	34.00-35.00

CLEVELAND

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00†
No. 1 factory bundles	27.00-28.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Machine shop turnings	10.00-11.00
Shovel turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Cast iron borings	14.00-15.00
Cut foundry steel	28.00-29.00
Cut structurals, plate 2 ft and under	31.00-32.00
Low phos. punchings & plate	26.00-27.00
Alloy free, short shovel turnings	14.00-15.00
Electric furnace bundles	24.00-25.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	24.00-25.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	28.00-29.00
Brake shoes	35.00-36.00
Clean auto cast	42.00-43.00
Burnt cast	30.00-31.00
Drop broken machinery	42.00-43.00

Railroad Scrap

R.R. malleable	42.00-43.00
Rails, 2 ft and under	45.00-46.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	38.00-39.00
Cast steel	32.00-33.00
No. 1 railroad cast	42.00-43.00
Railroad specialties	37.00-38.00
Angles, splice bars	36.00-37.00
Rails, rerolling	51.00-52.00

Stainless Steel Scrap
(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	160.00-165.00
18-8 turnings	70.00-75.00
430 clips, bundles, solids	75.00-80.00
430 turnings	20.00-30.00†

YOUNGSTOWN

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	21.00-22.00
No. 1 busheling	26.00-27.00
No. 1 bundles	26.00-27.00
No. 2 bundles	20.00-21.00
Machine shop turnings	12.00-13.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	27.00-28.00
Electric furnace bundles	27.00-28.00

Railroad Scrap

No. 1 R.R. heavy melt.	26.00-27.00

BUFFALO

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Shovel turnings	13.00-14.00
Machine shop turnings	9.00-10.00
Cast iron borings	11.00-12.00
Low phos. structurals and plates, 2 ft and under	33.00-34.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	*37.00-38.00*
No. 1 machinery	*44.00-45.00*

Railroad Scrap

Rails, random lengths	36.00-37.00
Rails, 3 ft and under	42.00-43.00
Railroad specialties	35.00-36.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	22.50-23.50
No. 2 heavy melting	19.50-20.50
No. 1 bundles	22.50-23.50
No. 2 bundles	15.00-16.00
No. 1 busheling	22.50-23.50
Machine shop turnings	8.00-9.00
Mixed borings, turnings	8.00-9.00
Shovel turnings	10.00-11.00
Cast iron borings	10.00-11.00
Low phos. 18 in.	31.00-32.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00-29.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	36.00-37.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	28.00
No. 1 bundles	35.00
No. 2 bundles	19.00
No. 1 busheling	35.00
Electric furnace bundles	36.00
Mixed borings, turnings	14.00†
Shovel turnings	18.00
Machine shop turnings	13.00
Heavy turnings	25.00†
Structurals & plates	37.00-39.00
Couplers, springs, wheels	37.00
Rail crops, 2 ft & under	47.00-49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	37.00
Drop broken machinery	*47.00-48.00*
Malleable	46.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	18.00-19.00
No. 1 bundles	27.00-28.00
No. 2 bundles	13.00-14.00
Machine shop turnings	4.00-4.50†
Mixed borings, turnings	4.50-5.00†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	31.00-32.00†

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	28.00-29.00

Stainless Steel

18-8 sheets, clips, solids	145.00-150.00
18-8 borings, turnings	75.00-80.00
410 sheets, clips, solids	45.00-50.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 1 busheling	23.00-24.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	*28.00-29.00*
No. 2 heavy melting	22.00-23.00
No. 1 bundles	28.00-29.00
No. 2 bundles	20.00-21.00
No. 1 busheling	29.00-30.00
Cast iron borings	10.00-11.00
Machine shop turnings	*15.00-16.00*
Shovel turnings	18.00-19.00
Bar crops and plate	36.00-37.00
Structurals & plate	36.00-37.00
Electric furnace bundles	*28.00-29.00*
Electric furnace:	
3 ft and under	*31.00-32.00*
2 ft and under	*33.00-34.00*

Cast Iron Grades

No. 1 cupola	45.00-46.00
Stove plate	45.00-46.00
Unstripped motor blocks	32.00-33.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	*44.00-45.00*
Rails, random lengths	*38.00-39.00*
Angles, splice bars	37.00-38.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	27.00
No. 2 heavy melting	25.00
No. 1 bundles	28.00
No. 2 bundles	18.00
No. 1 busheling	28.00
Machine shop turnings	*7.00*
Shovel turnings	*9.00*

Cast Iron Grades

No. 1 cupola	*38.00*
Charging box cast	33.00
Heavy breakable cast	31.00
Unstripped motor blocks	33.00
Clean auto cast	39.00
Stove plate	*34.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*28.00*
Rails, random lengths	34.00
Rails, rerolling	*44.00*
Rails, 18 in. and under	38.00
Angles, splice bars	*32.00*

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	*31.00-32.00*
No. 2 heavy melting	29.00
No. 1 bundles	*31.00-32.00*
No. 2 bundles	*18.00-19.00*
Machine shop turnings	7.00-8.00†
Low phos. plate & structurals:	
3 ft	35.00
2 ft and under	37.00-38.00

Cast Iron Grades

No. 1 cupola	34.00-34.50
Heavy breakable	25.00
Foundry malleable	29.00-30.00†
Unstripped motor blocks	28.00-28.50

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00

LOS ANGELES

No. 1 heavy melting	*29.00**
No. 2 heavy melting	*26.00**
No. 1 bundles	30.00†
No. 2 bundles	*17.00**
Machine shop turnings	12.00-15.00†
Shovel turnings	13.00-16.00†
Cast iron borings	13.00-16.00†
Cut structurals and plate 1 ft and under	41.00†

Cast Iron Grades

No. 1 cupola	*38.00-41.00*

Railroad Scrap

No. 1 R.R. heavy melt.	33.00†

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	38.00
No. 2 heavy melting	35.00
No. 2 bundles	19.00
Shovel turnings	13.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	33.00
Heavy breakable	31.00
Unstripped motor blocks	31.00
Stove plate (f.o.b. plant)	18.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	35.00
No. 1 (prepared for shears)	33.00
No. 1 hvy (unprepared)	33.00
No. 2 heavy melting	33.50
No. 2 hvy (unprepared)	30.00
No. 2 (prepared for shears)	28.00
No. 2 bundles	20.00
Shovel turnings	15.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	33.00
Unstripped motor blocks	30.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	29.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00-48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	25.80
No. 2 hvy melt, 2 ft & under	25.50
No. 1 bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	25.50
Unprepared	20.45
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	43.00

*For export add $4 dock charges.
†Nominal.
‡F.o.b. Hamilton, Ont.

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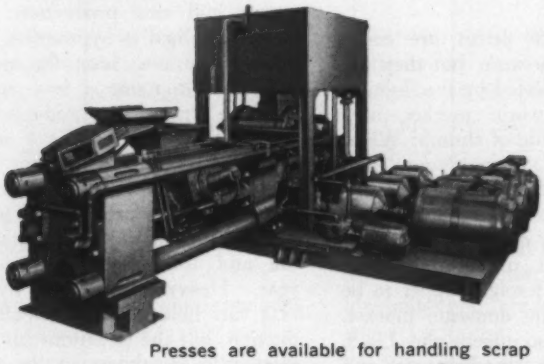

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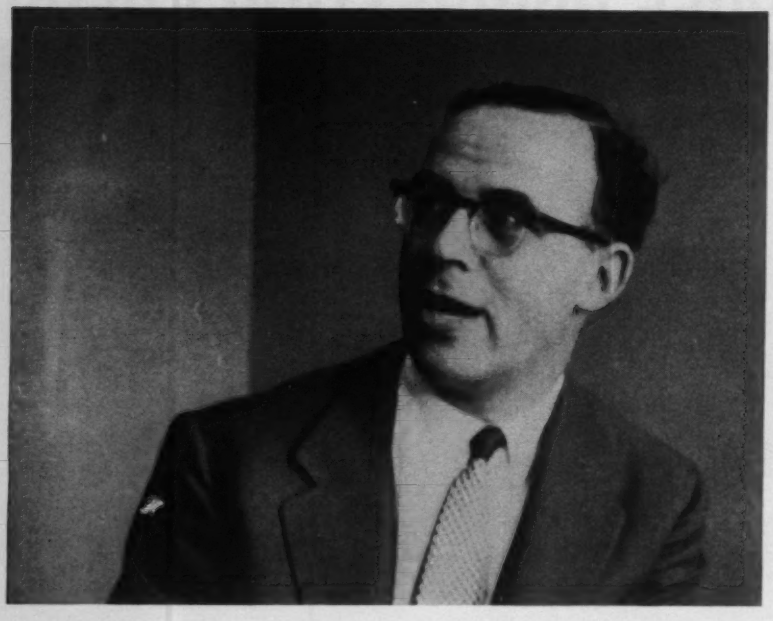


Asarco's Strauss analyzes copper, lead, zinc . . .

Prices, Problems, Outlook

Nonferrous Metal Prices, Pages 168 & 169

SALES of copper, lead, and zinc should perk up in 1961 even if there is no general business upswing, predicts Simon D. Strauss, vice president-sales, American Smelting & Refining Co. Major reason: A wave of "destocking" by consumers has (in effect) shifted the inventory burden from the consumer to the producer. Some catching up seems likely because the three metals have done worse than the economy as a whole this year.

• **Prices Not Too Strong** — Zinc sales this year have also been hurt by reduced steel operations and the popularity of the compact auto (the average compact uses only half as much zinc, 25 to 35 lb vs. 65 to 70 lb on larger models). Business next year should be up—but perhaps not enough to sustain the present 13 cent a pound price. A quotation that high might not be in effect now if it weren't for strikes within the industry.

Lead has just about held its own over the last few years. Sales dipped in 1958, rose in 1959, and are down again this year. Outlook for 1961: Up a little. The present price of 12 cents a pound is generally considered low, so it probably won't fall in 1961.

U. S. copper prices are more stable than they were, but they are still strongly affected by the fluctuations on the world market, says Mr. Strauss. Rule of thumb: When the overseas quotation is more than 3 cents a pound under the domestic price and it holds for a time, you can look for a drop in the U. S. price. At that differential, it is economical for foreign copper to be shipped into the domestic market. Such a gap also places the U. S. fabricator at a disadvantage and further opens up this market to imports.

• **Fewer Fluctuations**—It's unlikely though that you'll again see the wide fluctuations in price like those in 1955 and 1956 when copper rose to 46 cents a pound. Today, there are additional sources of supply (like Peru and Australia, plus more in Canada). Also, it is recognized that metal usage declines when prices go up sharply, so producers try to hold the price line, explains Mr. Strauss.

• **Copper's Cost Problem** — The chief cost in copper recovery is mining. Only 5 to 10 per cent of the cost of making steel and aluminum goes back to mining vs. 60 to 70 per cent for copper, says Mr. Strauss. To illustrate: To get 900,000 tons of domestically produced copper in 1958, some 115 million tons of ore had to be mined. By comparison, the steel industry can produce 100 times as much metal per ton of ore mined.

Further complication: It's difficult to adjust copper production to demand. When production is not related to demand, stocks rise and prices weaken. Yet when demand falls, it's not just a question of cutting back production 5, 10, or 15 per cent, explains Mr. Strauss. Many mines are located in isolated areas. It's a severe blow to a community when production is cut. Mine flooding and other operational considerations also must be taken into account.

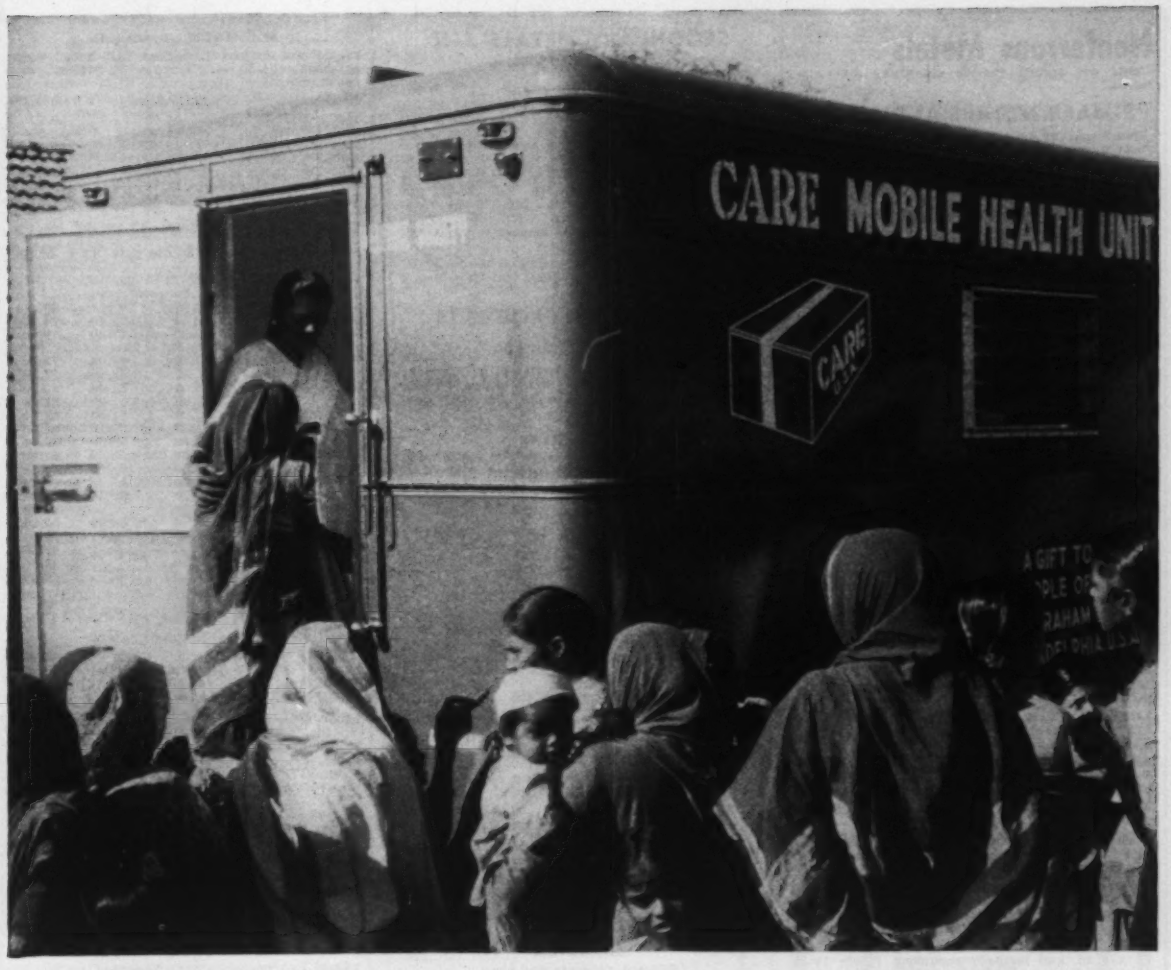
To a lesser extent, the same factors are true for lead and zinc.

• **Tail Can Wag Dog**—There's another consideration in the rate of copper and zinc production: The metals obtained as byproducts. Cadmium, selenium, bismuth, arsenic, tellurium, to name a few, are dependent upon the production of copper and zinc. About 1 ton of cadmium is recovered from every 5000 to 6000 tons of zinc ore. Domestic copper production is the source of about 500 tons of selenium and 100 tons of tellurium a year. Heavy demand for byproducts can hold up base metal production, but the situation can bring some price weakness in the major metal via overproduction.

In the Markets

• **Record in Sight** — Primary aluminum producers turned out 167,015 tons of metal in October and

(*Please turn to Page* 169)



Your CARE dollars save lives

Here is the biggest "CARE package" the people of America ever sent to desperately poor people of other lands: A mobile health unit which brings medical care to four villages in India. It heals the sick. It teaches simple hygiene. It helps people find strength enough to lift themselves by their own bootstraps.

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The unit above is sponsored by the Bombay Mothers' and Children's Welfare Society and staffed by a native medical team—doctor, nurse, technician, driver-helper. Diagnosis ... treatment ... surgery ... preventive medicine—all are part of the job.

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What does a mobile health unit cost? Around 11,500 dollar bills pooled together. But it treats about 20,000 people a year—that's 58¢ per patient. Divide that by its many years of service ... calculate, if you can, the immeasurable human good every penny does—and you know that CARE dollars ear-marked for health units buy the biggest bargain on earth. Will you help? Send dollars to CARE, New York 16.

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CARE's choice ☐

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ADDRESS_____

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(Space donated by this publication)

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.ob. Laredo, Tex., in bulk. Foreign brands, 99.5%, 26.25-26.75, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment data, f.ob. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.
Copper: Electrolytic, 30.00 deld.; custom smelters, 30.00; lake, 30.00 deld.; fire refined, 29.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-99 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $208-210 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.
Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $45-50 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.
Sodium: Solid pack, c.l., 1950; l.c.l, 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.
Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.
Tellurium: $3.50-5 per lb, 100 lb or more.
Thallium: $7.50 per lb.
Tin: Straits, N. Y., spot, 102.875; prompt, 102.75.
Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.
Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75-2.85 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.10-4.00.
Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00. East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.35; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.
Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb, 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.
(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.000.

Brass Ingot: Red brass, No. 115, 28.25; tin bronze, No. 225, 38.00; No. 245, 32.50; high-leaded tin bronze, No. 305, 32.75; No. 1 yellow, No. 405, 23.50; manganese bronze, No. 421, 27.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.945, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.945, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.ob. eastern mills, 20,000-lb lots, 35.35; l.c.l., 35.98. Weatherproof, 20,000-lb lots, 36.40; l.c.l., 37.05.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt: traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	64.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths: .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.50-24.00; No. 2 heavy copper and wire, 21.75-22.25; light copper, 19.25-20.25; No. 1 composition red brass, 18.50-19.00; No. 1 com-

BRASS MILL PRICES

MILL PRODUCTS a

	Strip, Plate	Rod	Wire	Seamless Tubes	SCRAP ALLOWANCES e (Based on copper at 30.00c) Clean Heavy	Rod Ends	Clean Turnings
Copper	55.13b	52.36c	....	56.32	26.000	26.000	25.250
Yellow Brass	49.27	34.88d	49.56	53.43	20.375	19.625	18.625
Low Brass, 80%	51.75	51.69	52.04	55.81	22.500	22.250	21.750
Red Brass, 85%	52.62	52.56	52.91	56.68	23.250	23.000	22.500
Com. Bronze, 90%	54.03	53.97	54.32	57.84	24.000	23.750	23.250
Manganese Bronze	57.77–57.82	51.42–51.46	61.69	....	19.250	19.000	18.375
Muntz Metal	52.14	47.45	....	....	19.475	19.125	18.625
Naval Brass	54.08	47.89	60.39	58.24	19.125	18.875	18.375
Silicon Bronze	60.45-60.48	59.64–59.67	59.74–59.77	78.89	25.500	25.250	24.500
Nickel Silver, 10%	64.68	67.01	66.76	....	25.125	24.875	12.562
Phos. Bronze, A-5%	75.70	76.20	75.45	77.63	27.125	26.875	25.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

position turnings, 17.50-18.00; new brass clippings, 16.00-16.50; light brass, 13.00-13.50; heavy yellow brass, 14.00-14.50; new brass rod ends, 15.00-15.50; auto radiators, unsweated, 14.25-14.75; cocks and faucets, 15.75-16.25; brass pipe, 16.50-17.00.

Lead: Soft scrap lead, 7.75-8.00; battery plates, 3.00; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-24.00; old sheets 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 3.00-3.50; new diecast scrap, 4.25-4.50; old diecast scrap, 2.75-3.00.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 6.00-6.50; segregated low copper clips, 13.00-13.50; segregated high copper clips, 12.00-12.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.50-14.00; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.00; clean borings and turnings, 8.50; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 56.00; light scrap, 51.00; turnings and borings, 36.00.

Copper and Brass: No. 1 heavy copper and wire, 24.25; No. 2 heavy copper and wire, 23.25; light copper, 20.75; refinery brass (60% copper) dry copper content, 21.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.25; No. 2 heavy copper and wire, 23.25; light copper, 20.75; No. 1 composition borings, 19.75; No. 1 composition solids, 20.25; heavy yellow brass solids, 15.00; yellow brass turnings, 14.50; radiators, 16.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.04; oval, 43.50 5000-10,000 lb; electrodeposited, 39.00, 2000-5000 lb lots; cast, 41.50, 5000-10,000 lb quantities.
Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 121.50; 200-499 lb, 120.00; 500-999 lb, 119.50; 1000 lb or more, 119.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.25; 2000-5900 lb, 13.25; 6000-11,900 lb, 13.00; 12,000-22,900 lb, 12.75; 23,000 lb or more, 12.25.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 80.10; 100-600 lb, 70.70; 700-1900 lb, 68.00; 2000-9900 lb, 66.10; 10,000 lb or more, 64.80.

Stannous Chloride (Anhydrous): 25 lb, 155.60; 100 lb, 150.70; 400 lb, 148.30; 800-19,900 lb, 107.40; 20,000 lb or more, 101.30.

Stannous Sulphate: Less than 50 lb, 140.70; 50 lb, 110.70; 100-1900 lb, 108.70; 2000 lb or more, 106.70.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(Concluded from Page 166)

are now assured of a record production year even though output will drop this month and next. STEEL's estimate for 1960: 2,010,000 tons.

• **Imports Still Hurt Mills**—Brass mill product imports will wind up a little under last year's, while exports will make a shade better showing. Yet imports will still take about 10 per cent of the domestic market (as they did last year) since U. S. demand is down. Through October, imports totaled 129,181,000 lb vs. 199,369,000 lb for all of '60. Exports over the first nine months totaled 13,633,000 lb compared with 16,346,000 lb for all of 1959.

CLASSIFIED

Help Wanted

ENGINEER—PRODUCTION WELDING
Desire man with experience in material handling. Some background in welding and/or metallurgy desirable but not essential. Job would involve quality control and methods evaluation for producer of continuous welded rail using the electric flash-butt method. Some traveling involved occasionally with headquarters in Chicago area. Opportunity for growth in new industry with growing Company. Please send full details, including experience and salary desired, in first letter. Reply Box 884, STEEL, Penton Bldg., Cleveland 13, Ohio.

GENERAL MANAGER FOR SMALL STEEL ROLLING MILL
Merchant or bar mill experience required. Age 35 to 55. Replies strictly confidential. Salary open. Submit resume of experience to Box 885, STEEL, Penton Bldg., Cleveland 13, Ohio.

WANTED BY USER

72" x ¼" and ⅛" coil slitting lines
48"—60" x 10' minimum sheet stretcher straightener
66" up cut line
20" to 36" reversing mill, 4 high preferred
2 high skin pass mill
72" continuous pickling line—coils up to 20 ton—narrower lines considered
5,000 and up draw benches.

Send full details first letter.

Reply Box 887, STEEL
Penton Bldg. Cleveland 13, Ohio

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Structural steel shop. 3,000 ton annual capacity. Central California, fast growth area. $110,000 for land, building, and equipment, or will lease to responsible and experienced parties. Box 883, STEEL, Penton Bldg., Cleveland 13, Ohio.

WANTED
METAL CLEANING EQUIPMENT SALES SPECIALISTS
for new Conveyorized Ultrasonics

We are now ready to enter into a full-scale National marketing program on our revolutionary AutoSonex metal cleaning equipment, and require the services of the most experienced, intelligent, and successful sales representatives in each marketing area.

AutoSonex is a new packaged cleaning machine which employs conveyorized ultrasonics to introduce automation to the cleaning process for the first time. It provides remarkable advantages in better, more efficient cleaning at significant savings of time, space, cost, manpower, and maintenance. Live inquiries from hundreds of manufacturers as a result of initial stories in various magazines, give us reason to believe there is a vast, virgin market for this product—as well as for numerous additional products and applications now in advanced stages of development.

If you can qualify as a top man with the ability for creative sales engineering and determination to do a top job, please write today in detail, outlining territory covered, experience and background, and if you are an individual or organization. Your reply treated in strictest confidence.

AUTOSONICS, INC.
4217 Chestnut Street
Philadelphia 4, Pa.

HOT STRIP MILL ROLLER

EXCELLENT OPPORTUNITY

Large operating steel plant in Western Pennsylvania has opening for semi-continuous hot strip mill roller; alloy & stainless experience preferred. This position affords an ideal opportunity for upgrading from your present position.

Please submit complete resume, including experience, education & salary required to:

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Penton Bldg., Cleveland 13, Ohio

All replies will be held in strict confidence and only those meeting the requirements will be considered.

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H&S The HORSBURGH & SCOTT CO.
5112 Hamilton Ave. • Cleveland 14, Ohio

Manufacturers of Gears and Speed Reducers for over 75 years

AGMA

(*Concluded from Page* 163)

This year, the Canadian steel industry has benefited from steel orders placed for a natural gas pipeline being built in the West and by strong export demand. The outgoing movement of pig, ingots, blooms, and billets increased from $18.4 million in the first nine months of 1959 to $34.4 million in the current year. Shipments of rolling mill products more than doubled, rising from $21.6 million to $50.3 million.

Other exports: Engines and boilers, from $29.5 million to $38.1 million; machinery, from $33.3 million to $49.8 million.

During October, the Canadian steel mills operated at 83.7 per cent of capacity to produce 477,369 tons of ingots.

Alcoa Rivet Stock Is Available in Wider Range

Availability of a wider range of large diameter, aluminum rivet stock has been announced by Aluminum Co. of America, Pittsburgh. Coiled rivet rod—used to produce bolts and other cold headed products, in addition to rivets—is offered by Alcoa in diameters up to 1 in. Previously, the company offered coiled rivet rod up to only 0.615 in.

The large diameter stock is supplied in all suitable cold heading alloys in annealed and strain hardened tempers, in 120 lb coils, measuring about 36 in. ID. Larger, 240 lb coils are available for quantity orders.

Shipments of Steel Drums And Barrels Cut Slightly

The movement of steel shipping barrels and drums in September totaled 2,648,289 units, 3 per cent below shipments in August and 17 per cent above those in September, 1959, reports the Census Bureau. Cumulative total for the first nine months was 23,177,992 units vs. 26,005,655 in the same period last year.

Shipments of steel pails in September amounted to 6,462,235 units, down 9 per cent from the August total and 4 per cent from that for September, 1959. The total for the first nine months this year was 55,992,961 units vs. 62,997,508 in the same period last year.

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TO FIND THE MAN YOU NEED...

Place an advertisement in the "Help Wanted" columns of STEEL's classified pages. Your advertisement will reach the qualified men you need, because STEEL is addressed to highly-trained men in all phases of metalworking.

STEEL
The Metalworking Weekly

Bearing at left has 1.75" bore, while tandem bearing in main illustration has 17.0" bore. *Yet both are standard, cataloged items.*

Over 400 Cataloged Thrust Bearings

to fit your every need . . .

When you need a thrust bearing, no matter how special, Rollway is ready with the know-how and the precision machinery to design and produce it for you.

Our engineers will gladly consult with you regarding any standard or special-purpose types you need. No cost. No obligation. Rollway Bearing Co., Inc., Syracuse. N. Y.

Complete line of Radial and Thrust Cylindrical Roller Bearings

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BEARINGS

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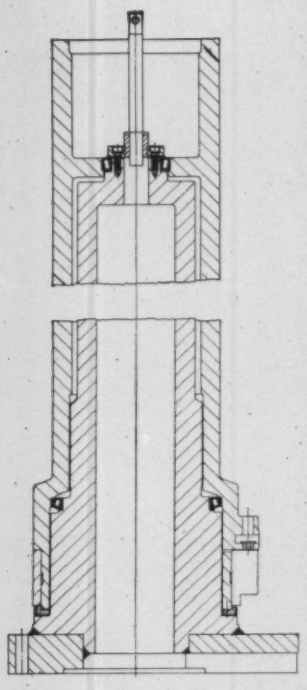
1,000 Feet of NORMALIZING LINE at Inland Steel

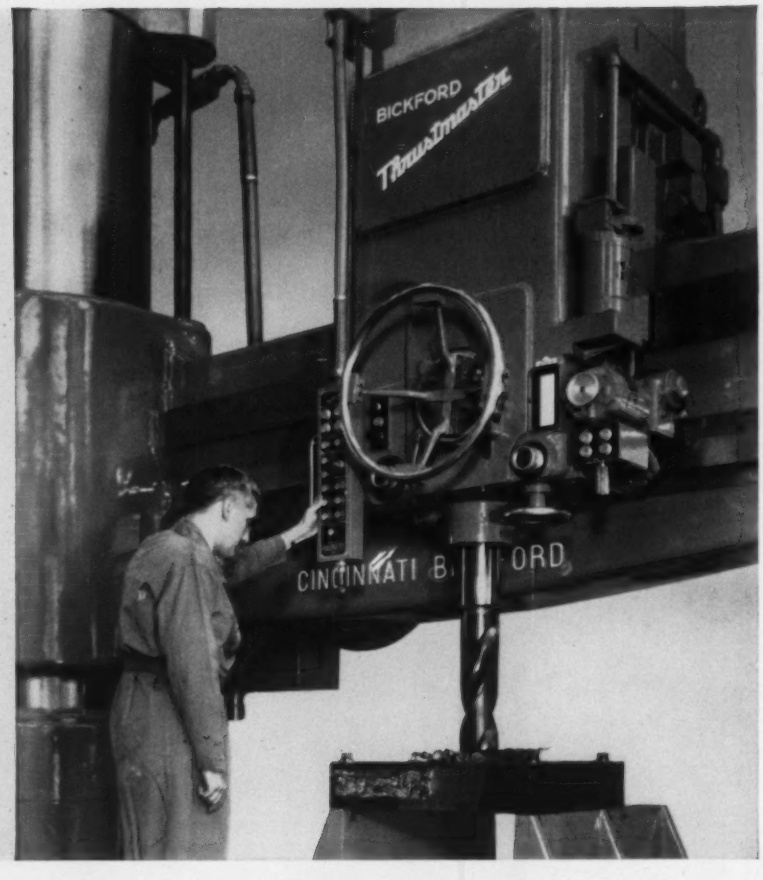
This is another major unit in the continuing expansion program of Inland Steel Company of Chicago. The line normalizes cold rolled mild steel strip, 16 to 24 ga., 24 to 60″ wide, at furnace speed of 50 to 125 f. p. m. 60,000 lb. coils are fed into the line and 40,000 lb. coils are handled at the delivery end. Shearing facilities included in the line are suitable for sheets from 36″ to 192″.

Aetna-Standard's experience with Processing Lines dates back to the earliest production of strip in coils. This experience includes the design and building of many Continuous Electrolytic Tinning, Annealing and Normalizing Lines, as well as Continuous Galvanizing Lines. Aetna-Standard Division, Blaw-Knox Company, 300 Sixth Avenue, Pittsburgh, Pennsylvania.

Aetna-Standard Division
BLAW-KNOX



How **CINCINNATI-BICKFORD** mounts column of "Thrustmaster" radial drill on Timken bearings to assure rigidity.

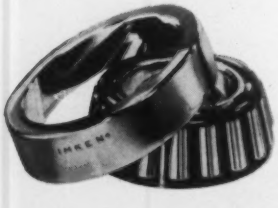


World's most powerful radial drill uses 41 Timken® bearings to assure rigidity, handle extreme loads

WEIGHING 80,000 lbs. and driven by a 50 h.p. electric motor, this 34-inch diameter column "Thrustmaster", by Cincinnati-Bickford Division of Giddings & Lewis Machine Tool Company, is the world's most powerful radial drill. To resist stresses and reduce arm deflection, the column is mounted on large pre-loaded Timken® bearings—one at the top, one at the bottom. They give the column and sleeve the rigidity of a single piece, resulting in greater accuracy and longer tool life, with higher speeds and coarser feeds. And 39 more Timken tapered roller bearings are used in the drill head. Timken bearings assure better performance because they . . .

1) *Take all loads.* Their taper lets Timken bearings take *both* radial and thrust loads. And full-line contact between rollers and races gives extra load-carrying capacity. 2) *Practically eliminate friction.* Timken bearings are geometrically designed and precision-manufactured for true rolling motion.

And Timken bearing service from graduate engineer salesmen qualified to work with your purchasing, engineering and production people is an *extra* advantage. It's service, backed by research and testing facilities unique in the bearing industry. ***That's why Timken bearings give you:*** *1) Quality you can take for granted. 2) Service you can't get anywhere else. 3) The best-known name in bearings. 4) The pace setter in lower bearing costs.* Specify Timken bearings for the machines you use or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.* Canadian Division: Canadian Timken, St. Thomas, Ontario.



Industry rolls on

TIMKEN®

tapered roller bearings